THE NAZI'S FOOLPROOF PLANE page 38

FLYING

SEPTEMBER 1948 • 25 CENTS

PUBLIC LIBRARY
DETROIT

JETS IN COMBAT
page 26

All Signs Point To
FLIGHTEX
QUALITY
SERVICE
DEPENDABILITY
FLIGHTEX FABRIC
You're on the road to superior fabric when you head for Flightex. Did you know that each year more manufacturers buy more Flightex than any other airplane fabric?

World's Premier Airplane Fabric FLIGHTEX FABRIC

FLIGHTEX

FLIGHTEX FABRICS, INC.
93 Worth Street • New York 13, N. Y.
Leading Manufacturers of Fabric and Tapes for the Aircraft Industry

Export Representative: AVIQUIPO, Inc.
25 Beaver St., New York, N. Y.
Cable Address: "Aviquipo"

West Coast Representative:
PACIFIC SUPPLY CO.
6715 Hollywood Blvd., Los Angeles, Cal.

RESALE DISTRIBUTORS

AERONAUTICAL TRADING CO., Jamaica, N. Y.
AIR TRANSPORT EQUIPMENT, Inc., Mineola, N. Y.
AVIATION SUPPLY CORP., Atlanta, Ga., Orlando, Fla., Tampa, Fla., Hialeah, Fla., Charlotte, N. C., Nashville Tenn., New Orleans, La.
BUFFALO AERONAUTICAL CORP., Buffalo, N. Y.
DURHAM AIRCRAFT SERVICE INC.,
BOB TRADER AERO SUPPLY DIV., Pittsburgh, Pa.
EASTERN AIRMOTIVE CORP., Richmond, Va.
GENERAL AIRCRAFT SUPPLY CORP. Detroit, Mich.
GENERAL AIRMOTIVE CORP., Cleveland, O.
HOOVEN CO., Washington, D. C.
INTERCITY AVIATION, INC., East Boston, Mass.
KARL ORT, York, Pa.
LEAVENS BROS. AIR SERVICE LTD., Toronto, Can.
LOUISIANA AIRCRAFT, Baton Rouge, La.
MUNCIE AVIATION CORP., Muncie, Ind.
PACIFIC AIRMOTIVE, Burbank, Cal., Glendale, Cal., Oakland, Cal., San Diego, Cal., Fresno, Cal., Kansas City, Mo., Seattle, Wash., Phoenix, Ariz., Anchorage, Alaska, Linden, N. J.
PIEDMONT AVIATION, INC., Winston-Salem, N. C.
SNYDER AIRCRAFT CORP., Chicago, Ill., Columbus, O., Denver, Colo., Omaha, Neb.
SOUTHWEST AIRMOTIVE CO., Dallas, Tex.
SUPPLY DIVISION, INC., Robertson, Mo., Memphis, Tenn., Oklahoma City, Okla.
THE AIRCRAFT STEEL & SUPPLY CO., Wichita, Kan., Oklahoma City, Okla.
VAN DUSEN AIRCRAFT SUPPLIES, Minneapolis, Minn., Teterboro, N. J.
WEST AIR, INC., Salt Lake City, Utah
WESTERN AERO SUPPLY, San Antonio, Tex.

Keeps a plane from wiggling its nose

TAKING the shimmy out of nose wheels is a problem that has plagued a lot of airplane engineers. Shimmy sets up vibration in the plane's nose. Too much of it can even damage the airplane.

Convair engineers, designing the new 240, figured out a way to fight shimmy at its source. Instead of the standard design of wheels turning independently on the axle, their new design called for co-rotating axle and dual wheels. With the wheels turning together, they reasoned, the opposing pull of one would keep the other rolling steadily and smoothly.

B. F. Goodrich engineers tackled the job of developing the new wheels. They built light, strong duals. Engineered the wheels to provide a rigid mounting on the axle. Balanced them precisely.

Tests of the new assembly showed remarkable results! Shimmy and vibration were eliminated.

The Convair-Liner's nose wheels—like the main wheels—are equipped with B. F. Goodrich tires. Smaller and lighter than the tires on prewar twin-engine transports, they have marked advantages in weight and economy. Because twin tires are used all around, safety is increased.

The research which keeps B. F. Goodrich first in rubber works to make flying better, cheaper and safer. Look for greater discoveries to come from the new B. F. Goodrich Research Center—world's leading center of rubber research. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

Chairman of the Board
WILLIAM B. ZIFF

President
B. G. DAVIS

Secretary-Treasurer
ARTHUR T. PULLEN

Vice-Presidents

GEORGE BERNER
Advertising and Sales Director

MICHAEL H. FROELICH
Director, Eastern Division

H. J. MORGANROTH
Production Director

H. G. STRONG
Circulation Director

Art Director
HERMAN R. BOLLIN

THE COVER: Republic's photo reconnaissance plane, the XR-12. Two have been delivered to Air Force. Photo by Harold G. Martin.

EDITORIAL

Editor and Publisher
WILLIAM B. ZIFF

Assistant Publisher
MICHAEL H. FROELICH

Managing Editor
CURTIS FULLER

Associate Editors
CHARLES L. BLACK
JUSTINE FEELY

Contributing Editors
GAITHER LITTRELL, Los Angeles
RICHARD SAUNDERS, Washington

Art Editor
LEW MERRELL

ADVERTISING

Eastern Advertising Manager
FRANK BENNETT

Midwestern Advertising Manager
WILLIAM M. SPRINGER

Western Advertising Manager
WILLIAM L. PINNEY

BRANCH OFFICES

NEW YORK (1)
Empire State Bldg., WI 7-0400

LOS ANGELES (14)
815 S. Hill St., TUcker 9213

TORONTO
21 King Street, East

ASSOCIATED COMPANY

Ziff-Davis, Ltd., Grampians Bldg. Western Gate, London, England

FLYING

SEPTEMBER • 1948

MILITARY

Air Power: The Decisive Weapon.....Maj. Gen. Earle E. Partridge 15
Strategy Against the Soviets.....Jared Hamilton 16
Arctic Air Force.....Maurice Roddy 19
Jets in Combat..... 26

CIVIL AVIATION

Curse of the Jenny..... 22
Seaplane Regatta.....Photos by Howard Levy 24
Search for a Lost Pilot.....Rosemary S. Paine 28
How to Weather the Blow.....Photos by Walter Steinhard 30
Built-In Airstrip.....Lawrence E. Keil 33
FLYING's Check Pilot: Luscombe Observer—90.....Max Karant 36
How Hard Do You Hit?.....Hy Sheridan 42

ENGINEERING

We Need a Lightplane Revolution.....William B. Stout 35
The Nazi's Foolproof Plane..... 38

WHERE TO FLY

FLYING Holiday
Midwest State Fairs.....Charles L. Black 40

DEPARTMENTS

The Mail Box..... 6
Notes on Civil Flying..... 8
Military News..... 10
Have You Seen?..... 43
I Learned About Flying from That! No. 106.....Richard H. Betchley 46
AOPA News..... 48
Fifteen Years Ago..... 50
Logging Time with Hy Sheridan..... 52
Photo Credits..... 60

COPYRIGHT 1948
ZIFF-DAVIS PUBLISHING COMPANY
185 North Wabash Ave., Chicago 1, Ill.
Member of the Audit Bureau of Circulations
VOLUME 43 • NUMBER 3

FLYING is published monthly by Ziff-Davis Publishing Company at 185 N. Wabash Ave., Chicago 1, Ill. SUBSCRIPTION RATES: In U. S., Canada, Mexico, South and Central America and U. S. Possessions, $3.00 for twelve issues; in British Empire, $4.00; all other foreign countries, $4.00 for twelve issues. Subscribers should allow two weeks for the change of address. Address all subscription letters to the Director of Circulation, FLYING, 185 North Wabash Avenue, Chicago 1. Entered as second class matter, September 8, 1942, at the Post Office, Chicago, Illinois, under the act of March 3, 1879. Entered as second class matter at the Post Office Department, Ottawa, Canada. Contributors should retain copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever adaptations and revisions are necessary to meet requirements. Payment covers all authors', contributors' and contestants' rights, title and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

STAMP OF APPROVAL
PIONEER AIR LINES
There's no doubt about it! Products that are used by America's leading airlines have got to be good! They must live up to high standards of performance and dependability.
When you choose a high-octane gasoline to fuel your own plane, and a highly-refined motor oil to keep it running smoothly, let your choice be guided by the choice of experts in the field of aviation . . . experts who have set their seal of approval on Phillips 66 aviation products.
You can buy and use . . . with confidence . . . any product bearing the Phillips 66 flying shield!
Aviation Dept., Phillips Petroleum Company, Bartlesville, Okla.
Phillips 66
AVIATION GASOLINE

Can you— IDENTIFY THESE AIRCRAFT INSTRUMENTS?

At A.S.A.I. You Reduce These And Many Other Instruments To Their Component Parts And Learn "What Makes Them Tick."

PRESSURE-MECHANICAL

This type is very important to successful flight. Can you name it? It is only one of scores of such instruments which are thoroughly covered by practical instruction at **American Schools of Aircraft Instruments.**

ELECTRICAL

Here's a tip on this one—how fast? Yes, it falls within the "electrical group." What is it? Students at **American Schools of Aircraft Instruments** learn how to service and maintain all major types of Aircraft Instruments.

GYROSCOPIC

This one is important to blind flight and navigation. Can you name it? This is the third broad group of aircraft instruments which are studied in every detail at **American Schools of Aircraft Instruments.**

DO YOU WANT A SPECIALIZED CAREER IN AVIATION?

Then be an Aircraft Instrument Technician and get your Training Now. 34 weeks intensive course approved for Veterans—available to non-veterans. **A.S.A.I.** approved by National Council of Technical Schools. Hundreds of **A.S.A.I.** graduates employed in the industry or have own business.

REMEMBER—in a national emergency, trained aircraft technicians, and those in training, will be in a favored position to render an important service to our nation.

SEND TODAY for this Interesting Booklet

To:
American Schools of Aircraft Instruments
5145 W. San Fernando Road, F-98
Los Angeles 26, California

Please send me FREE and WITHOUT OBLIGATION illustrated booklet describing Aircraft Instrument field.

Name.....Age.....

Address.....

City.....Zone.....

Veteran?..... State.....

THE MAIL BOX

THE SWIFT

. . . Can a 125 h.p. engine, and propeller, be easily and conservatively installed on an 85 *Swift*? Likewise, can the tail wheel and flap problems be cured effectively?

CLYDE H. SCHOMBEL
PAUL SELL
Fairbanks, Alaska

● An approved conversion bulletin has been completed by Temco and CAA for converting the 85 h.p. *Swift* to the 125 h.p. model. Detail involved depends on the serial number of the plane. Temco reports, "We have made one such conversion at our factory and know of several in the field. Considerable cost is involved, depending on the customer's ingenuity in disposing of 85 equipment. Essentially, the conversion requires a new engine mount, baffles, engine cowling, propeller, heavier landing gear (depending on serial number), wing fitting change (depending on serial number), metal control surfaces, if fabric is presently employed, and a goodly number of other small parts. Regardless, a conversion can be worked out satisfactorily, the controlling item being cost."—ED.

CALLING THE ROLL

. . . Regarding ["The House Fly's Hidden Gyro," July FLYING] I'd like to settle a long-standing argument at the airport. In landing on the ceiling, does a fly do a "half-roll" or a "half-loop"?

ROBERT A. NAGLE
Cleveland, O.

Now that we're all straightened out on the house fly's gyro, how about telling us how a fly manages to land on a ceiling? What's it do? A half loop? A half roll?

CHARLES L. MCKINNIS
Rolla, Mo.

● Half-roll.—ED.

RIGHT MEN—WRONG PLACES

UNLESS MY MEMORY IS SHOT, YOU'D BETTER BRUSH UP ON HAP ARNOLD AND JIMMY DOOLITTLE. [July FLYING, "Can You Name Them?"]

WALDO K. JOHNSON
Portsmouth, O.

● Reader Johnson's memory serves him well, as do those of scores of FLYING readers (including Frederick E. Thomas who phoned long-distance from Binghamton, N. Y., several hours after FLYING went on sale). James H. Doolittle, *not* Hap Arnold, first took-off and landed on gauges. Hap Arnold, *not* James H. Doolittle, learned to fly at Wright Brothers' Flying School, Dayton, O.—ED.

TAMED CUB

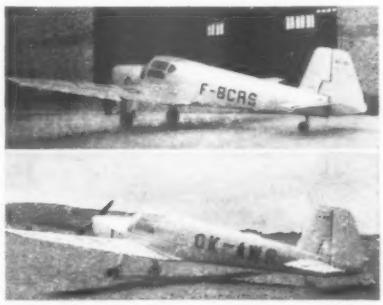
. . . In connection with your article "Tamed Cub" [June FLYING] I should like to point out that the elevators were moved physically out of the slipstream when the span was increased. The inboard end of the elevators were 28 inches from the airplane centerline but the elevator area remained essentially constant during this change. The tilt of the engine had no appreciable effect on the relative position of the elevators and slipstream but was for the purpose of changing the thrust moment about the center of gravity, and was in the direction to increase the elevator angle required to stall with power on.

PAUL A. HUNTER
Aeronautical Research Scientist
NACA-LMAL
Hampton, Va.

● Mr. Hunter, an NACA scientist, conducted original investigations regarding NACA's modified *Cub*.—ED.

DOUBLE VISION?

. . . When I saw the picture of the Zlin 281 ["Eight Czechs," FLYING May], I quickly reached for my photo album which contains a photo of the Bucker 181. I've concluded the Zlin 281 is either a



copy of the Bucker 181 or the same plane.

I have flown the 181, and find it an excellent plane, both in engineering and construction—and in flying characteristics. Though I haven't flown American post-war lightplanes, I believe the Bucker 181 surpasses the pre-war U. S. private planes in ease of handling in flight, and in engineering.

When I return to the U. S., I hope to find our new lightplanes incorporate many of the Bucker (and other foreign plane) features.

ROBERT R. RENFRO
Major, JAGD, U. S. Army
Army of Occupation
Germany

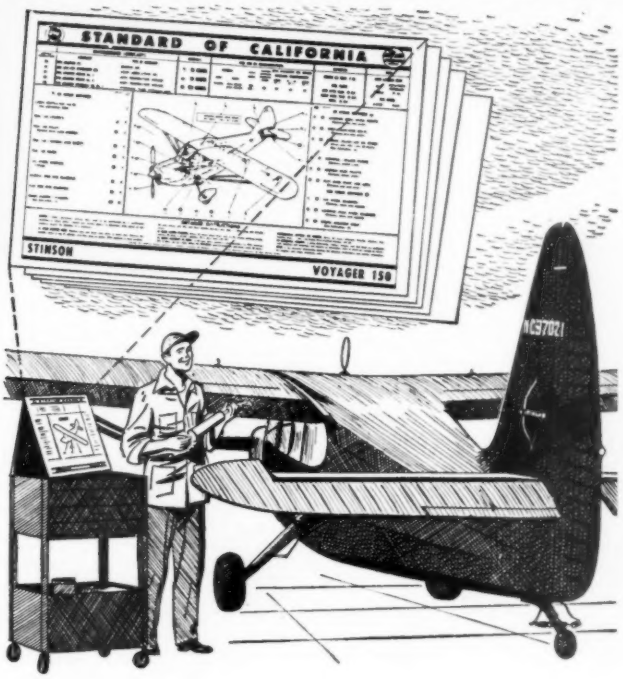
● Keen-eyed Reader Renfro knows his Bucker 181s. The former Zlinske Letecke A.S. of Otrokovice (originally a subsidiary of the well-known Bata footwear manufacturing concern) manufactured the Bucker *Bestmann*, modifying the design slightly and using a 106 h.p. Zlin Toma 4 engine instead of the 181's 105 h.p. Hirth H.M. 504 engine. With these modifications it is known as the Zlin 281. [Bucker, top; Zlin, bottom.]—ED. END

PLANE FAX

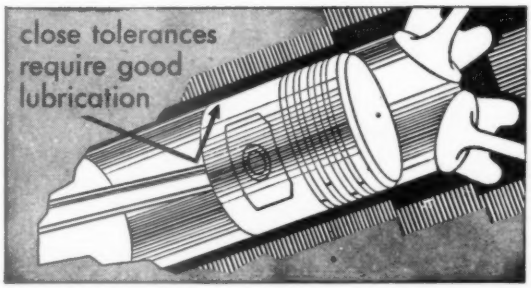
A page of service tips for private flyers and fixed-base operators

Special charts assure "tailored" lubrication

So important are the lubricants you use for wheel bearings, landing gear and control system that Standard Airport Dealers follow specially designed lubrication charts. Drafted with the cooperation of aircraft manufacturers, these charts specify the proper lubricant for most efficient operation for personal planes. So let Standard Airport Dealers assure perfect "fit" of oils and greases for your plane's parts.



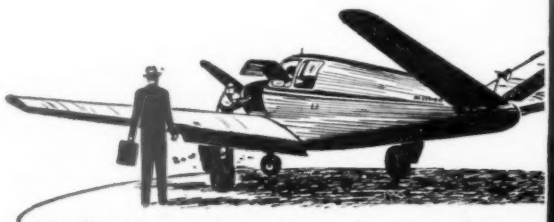
Thinned-out oil may starve engine parts



You probably know that when oil temperature goes dangerously high, the lubricant becomes dangerously thin. Oil that is too cold, on the other hand, will not circulate freely, may "starve" some parts and expose them to scoring. So it's a good policy first to learn the maximum and minimum oil temperature limits for your engine—and then select the proper grade of RPM Aviation Oil that will give best protection over a wide temperature range.

Special insulating material reduces pre-ignition

The best spark plugs operate at high engine output without overheating or causing pre-ignition. You'll find this a prime characteristic of Atlas Champion Aircraft Spark Plugs. For a special insulating material, the finest known to ceramic science, gives Atlas Champions remarkable resistance to pre-ignition. Your Standard Airport Dealer can tell you the full story of Atlas Champions.



We'll take better care of your plane

CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

LEARN AVIATION MECHANICS in AVIATION'S CAPITAL

Los Angeles builds 64% of Air Force Planes!

Imagine! A whopping 64% of all the planes ordered under the USAF's initial 70-Group contracts is being built in Los Angeles *within 10 miles of California Flyers.*

But that's not all. This famous school is adjacent to the famed Los Angeles Municipal Airport—western terminus of American, United, TWA, Western and Pan American ...and the home of North American and Douglas, two of the aircraft companies to receive the largest USAF orders

Here, *as nowhere else*, you train under men who are constantly in touch with the industry's leaders.

Here, *as nowhere else*, you learn the most advanced industry skills and techniques.

Here, *as nowhere else*, you have the greatest opportunity to select after graduation the branch of industry you prefer

California Flyers' Training Prepares You For All Branches of Aviation All Over the World

California Flyers' aviation mechanics training offers you unlimited opportunities not only in Southern California, but all over the world. You are trained for responsible positions in airline maintenance and aircraft plant production...you get the background knowledge so essential for careers in airport management, airline administration and other supervisory positions in aviation.

America's Foremost Aeronautical School Specializing in Aviation Mechanics Training

California Flyers is one of the oldest, most respected, aeronautical schools in America. Since its founding in 1930 it has specialized in aviation mechanics training, and today holds an enviable position in that field. Its outstanding career courses in Aircraft & Engine Mechanics (A. & E. Mechanics), Aircraft Mechanics and Engine Mechanics are approved for veterans and by the Civil Aeronautics Administration of the U. S. Gov't.

To make the most of a career in aviation, get the best possible training. Train at famous California Flyers in Los Angeles, the Aviation Capital of the World.

CALIFORNIA FLYERS

SCHOOL OF AERONAUTICS
ESTABLISHED 1930
Adjacent to Los Angeles Airport, Inglewood, Calif.

CLIP COUPON TODAY FOR COLORFUL NEW CATALOG AND VOCATIONAL GUIDE

CALIFORNIA FLYERS Dept. F-9
School of Aeronautics
1720 W. Florence Ave., Inglewood, California

Please send me new Catalog and Vocational Guide containing full information about tuition, courses, etc. and application blank. I understand this will not obligate me in any way

Name_____ Age____

Address_____

City_____ Zone____ State_____

There is NO FLYING involved in Aviation Mechanics Courses at California Flyers School of Aeronautics

HOUSING AVAILABLE

NOTES ON CIVIL FLYING

. . . **London Airport** had 2,184 radar GCA landings during the year ended July 1. About half were operational and the rest were practice. BOAC requires all captains on positioning flights from the maintenance base at Hurn to make a practice GCA landing on arriving at London.

. . . **Luscombe** is offering its 1949 **Silvaire Sky Pal** at $2,095, the lowest price at which an all-metal two-place plane has ever sold. The **Sky Pal** has a 65-

h.p. Continental engine, cruises at 105 m.p.h., has a range of 300 miles. Equipment includes dual controls, heel brakes, parking brakes, steerable tail wheel, two doors, basic instruments.

. . . **Paul MacCready**, 22, a Caltech student, won the 15th National Soaring Contest at Elmira, N. Y. Second place was won by John Robinson. MacCready's longest flight was 222 miles to Middlefield, O. Seventy pilots and 50 sailplanes participated.

. . . **Commercial trunk airlines** lost an estimated $13,846,000 during the first three months of this year as compared with $18,744,000 in the first quarter of last year. Operating expenses increased by $5,000,000, but revenues gained $10,000,000.

. . . **Seven hundred** American youths were flying to Europe this summer via Transocean Airlines. The travel program is sponsored by Youth Argosy, Inc., a member of the International Youth Hostel Federation. Youths in groups of 10, ranging from 17 to 25 years old, travel under an older leader.

. . . **Cook Cleland**, who won the 1947 Thompson Trophy at the Cleveland Air Races, is running a non-scheduled airline from Cleveland to Canadian hunting and fishing regions. The plane used is a converted *Catalina*.

. . . **Bonanzas** are rented for 9 cents per mile plus 40 cents per hour—or chartered for 12 cents per mile by Rent-a-Plane Company, Tulsa. Since its first plane proved profitable at such rates, the company has added six more. Rental utilization has averaged 60 hours per month per plane, most of it through charter trips. Branches have been opened at Wichita and Dallas.

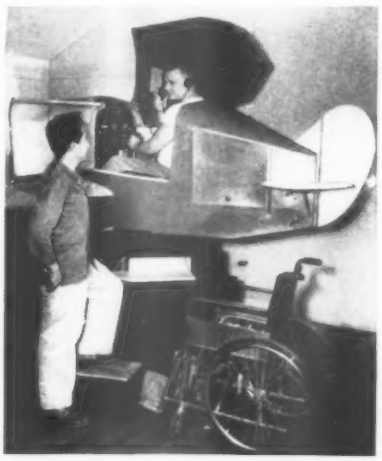
. . . **Spin tests** should be dropped from the private pilot's examination, according to the recommendation of the Non-Scheduled Flying Advisory Committee of the CAA. The committee points out that fatalities and serious accidents from spin and stall mishaps usually occur at low altitudes and a knowledge of spin recovery is useless.

. . . **A new freighter** version of the DC-6, to be known as the DC-6A and capable of carrying a 30,000-pound payload, is about 70 per cent completed. Plane is expected to be ready for flight testing next spring.

. . . **Boeing** has a $300,000,000 backlog in unfilled military and commercial orders—not including initial orders under the new 70-group Air Force program. Fifty-five **Stratocruisers** are on order representing approximately $80,000,000 in contracts.

. . . **Piper** Aircraft Corporation has retired its three-year $600,000,000 RFC loan in less than six months.

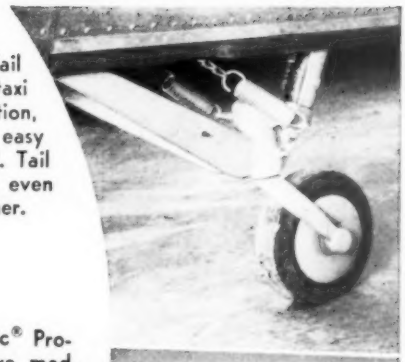
. . . **A paraplegic** war veteran, Joe Janhuba of Hines Hospital, has been given Link training instruction at Spartan



School of Aeronautics and is expected to instruct other patients at Hines. Janhuba was a Navy instrument flight instructor during the war.

THESE FEATURES MAKE IT EASY FOR YOU TO FLY THE Swift 125

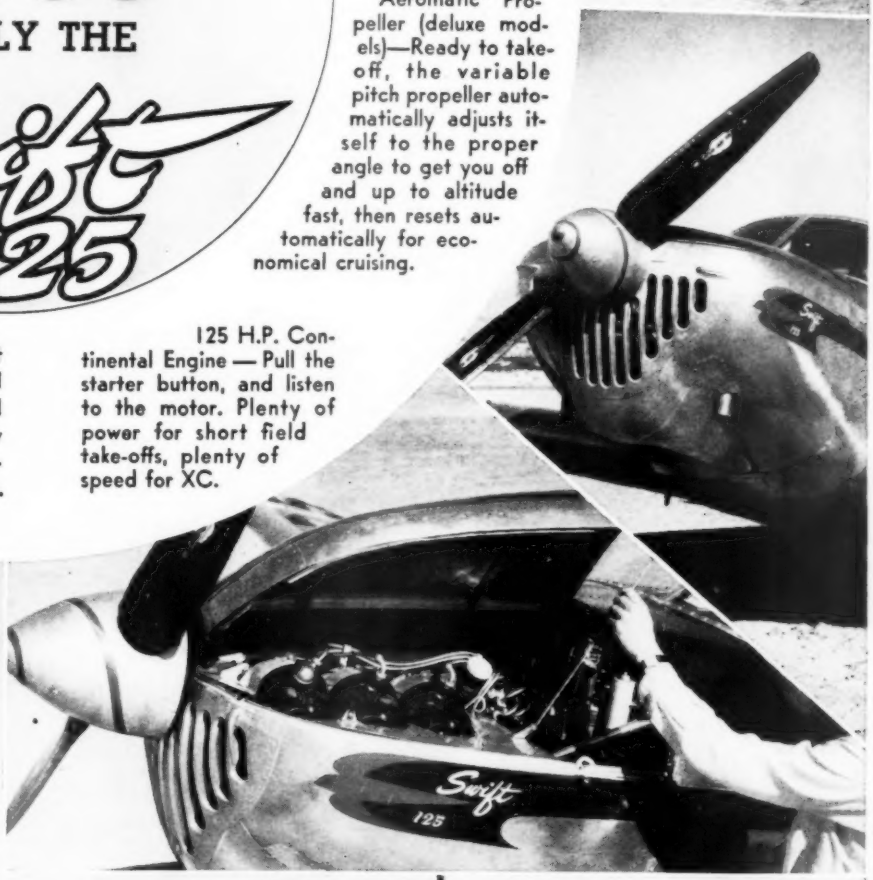
Steerable Tail Wheel—As you taxi to take-off position, you'll feel the easy ground control. Tail doesn't weave even in gusty weather.



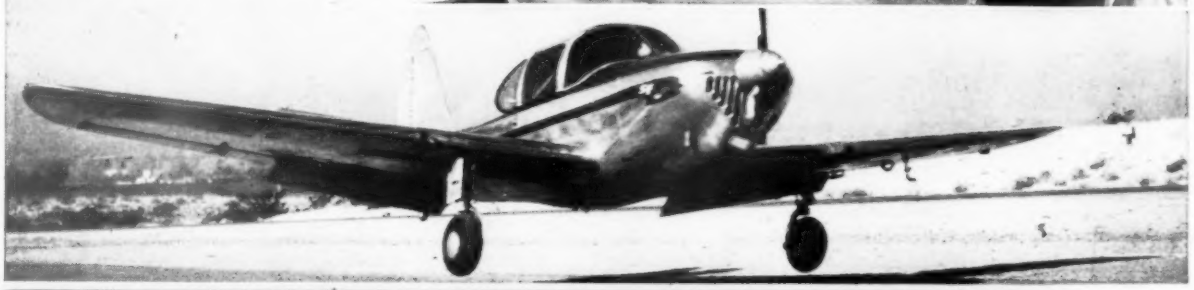
Aeromatic® Propeller (deluxe models)—Ready to take-off, the variable pitch propeller automatically adjusts itself to the proper angle to get you off and up to altitude fast, then resets automatically for economical cruising.

Hydraulic Flaps—Coming in on the final, if you're a little fast . . . apply the flaps . . . airspeed drops, and you're on the ground smoothly and easily as slow as 48 mph. Spot landings are a cinch.

125 H.P. Continental Engine — Pull the starter button, and listen to the motor. Plenty of power for short field take-offs, plenty of speed for XC.



9' 9" Wide Landing Gear — At the touchdown, you'll feel the stability of the wide gear tread. Hydraulic shock absorbers smooth out rough fields and landings, and the steerable tail wheel takes over to hold you straight and true. Easy, isn't it?



Texas Engineering & Mfg. Co.

P. O. Box 6191 F Dallas, Texas

Your Nearby Swift Dealer Invites You to Fly the Swift 125 and See for Yourself How Easy It Is.

Swift 125

AIRviews

Replacement spares for the DC-3, DC-4 and DC-6 commercial models and C-47 and C-54 military models, valued at more than $2,000,000 a month, are currently being shipped to some 350 customers operating in excess of 3,000 Douglas airplanes in all parts of the world.

To handle this large flow of spare parts quickly and efficiently, Douglas maintains a capable spare parts organization of 400 people. Each month they speed deliveries of some 20,000 items weighing approximately 650,000 pounds. And to facilitate operations, modern tabulating methods were recently introduced throughout the Douglas spare parts division.

Also, increasing use is constantly being made of air freight in the dispatching of spare parts. Today 60 to 75 per cent of all commercial spare parts are sent by air.

We here at Douglas realize full well that only an airplane ready and able to fly is a profitable or useful airplane. That is why particular attention is being paid to supplying correct spare parts in the shortest possible time. We will appreciate receiving from you at any time suggestions for the improvement of our spare parts service.

Donald W. Douglas

PRESIDENT
DOUGLAS AIRCRAFT COMPANY, INC.
SANTA MONICA, CALIFORNIA

MILITARY NEWS

. . . **The Air National Guard** has just received the first 42 of 107 F-80Cs to be purchased out of fiscal 1948 appropriations. The jet fighters go to the ANG in accordance with present policy to equip it with the most modern aircraft available. The planes fly faster than 600 m.p.h. and can carry two 1,000-pound bombs in addition to their regular six .50-caliber machine gun armament.

. . . **North American** is testing its new secret Navy XAJ-1, a bomber powered by two reciprocating engines and one jet engine.

. . . **Ultrasonic noises** from jet engines are harmless to humans, despite wild rumors to the contrary. The Navy has completed experiments at its Aero Medical Equipment Laboratory at Philadelphia which left Navy men being tested unharmed. The men were protected against noise by a helmet or springband headphones, double kapok-filled "ear doughnuts" and cotton ear plugs. Some of the men lost weight and seven said they were more tired than ordinarily, but the Navy concluded that "although high-frequency sound does damage some animal tissues, ill effects upon human tissues appear unlikely unless the frequency is extremely high." Published reports of "supersonic sickness" give no clear evidence of physical injury and may be pure sensationalism, or be caused by "suggestibility."

. . . **The "Petulant Porpoise"** is the name being given to a Grumman J4F (*Widgeon*) modified by Edo Corporation to have a removable hull. New lower hull sections can be installed and tested. Three hulls are to receive extensive tests, including one with a longer bow, deep V-shaped forward bottom section, streamlined tail section and V-shaped step.

. . . **Fairchild** has been awarded a contract for building 23 additional sets of the new track-type landing gear, demonstrated in May.

. . . **Six Lockheed Neptunes** (P2V) are being used by the Navy to photomap 30,000 square miles of Alaskan terrain this summer. Among purposes of the mapping are to estimate waterpower and paper pulp possibilities of the "panhandle" area from Skagway to the south.

. . . **The Navy** will accept 2,000 cadets into its Naval Aviation Cadet program during the present fiscal year, and will continue with large yearly quotas hereafter. Candidates must agree to serve a total of four years on active duty. Successful cadets will be commissioned either as Naval ensigns or as Marine 2nd lieutenants in the reserves.

. . . **An over-water** light flying suit incorporating a life preserver vest and emergency kit has been developed by Air Materiel Command. The suit's circular neck bladder and rectangular

chest bladder are inflated by a carbon dioxide cylinder. Bladders are so located that it would be virtually impossible for an injured airman to float face down if he lost consciousness. Leg pockets hold survival kits and rations.

. . . **The USAF's** Air Defense Command is being reorganized, with its six air forces reduced to four. The Second and 11th Air Forces will cease to exist. Hereafter the 10th Air Force will be responsible for protecting the Middle West; the 14th the southeast and southwest as far west as New Mexico; the 4th the eight western states, and the 1st the industrial northeast.

Dependable

CHAMPION

America's Favorite Spark Plug

R 37 S—1
Actual Size
Shielded Type

C26—
Unshielded
Actual Size 2⅛"

pre-proved dependability

When a specific type of Champion Spark Plug is approved for a given engine, you have double assurance that it is the best for that engine. Our own engineers, conducting their own research, also work closely with aircraft engine manufacturers in their test runs. Approval for any particular engine is only given after long, exhaustive and expensive tests.

We are proud of the fact that Champions are in daily use in practically every type of aircraft engine now in service. Champion Spark Plug Company, Toledo 1, Ohio.

FOLLOW THE EXPERTS

USE CHAMPIONS AND FLY WITH CONFIDENCE

Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network

The great new '48 Stinson. Cruising speed: 130 m.p.h. at 5000 feet. Non-stop flying range, 554 miles.

How a famous personal plane became
America's No. 1 Business Plane

WE LIKE IT when people ask us, *"Why does Stinson outsell all other 4-place planes combined?"*

The answer is so simple: The great new Stinson for '48 is America's most *useful* personal plane.

Day in, day out, more and more men —especially in the "over 40" group— are using this dependable, easy-to-fly plane to save valuable time and help them carry on their business activities more efficiently and more profitably.

It's such a *practical plane!* On family or business trips, 4 people fly in deep-cushioned, roomy comfort, with 100 pounds of luggage. With pilot, and full fuel tanks, Stinson will carry 640 pounds of cargo.

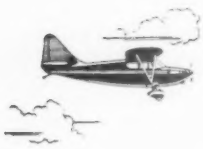
Above all, the Stinson is an extraordinarily *safe* plane, designed so that anyone can learn to fly it—quickly and easily.

So, see your Stinson dealer today for a demonstration flight in the new Stinson Voyager or the Flying Station Wagon.

For literature, write Stinson Division, Dept. D, Consolidated Vultee Aircraft Corp., Wayne, Mich.

Stinson

For 22 years, builders of America's most useful personal planes



"Using my one Stinson convinced me we needed two"

Frank Querry, 44-year-old manufacturer of chain link fencing, bought a Stinson and learned to fly it for pleasure and relaxation. He soon discovered it had *business* value, too.

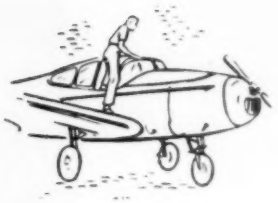
"I fly my installation crews to location in a hurry," he says. "What used to be a full day's trip now takes only a couple of hours. Jobs 500 miles away are now as profitable as jobs 100 miles away used to be."

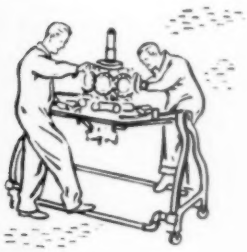
"I soon decided that a second Stinson, flown by my sales manager, would easily pay for itself. And it did—by saving time and transportation costs, and by expanding the territory we could serve."

FREE FLIGHT INSTRUCTION

IF you are a business or professional man interested in learning to fly, we invite you to inquire about your Stinson dealer's free flight instruction plan. Write W. H. Klenke, General Sales Manager, Stinson, Wayne, Michigan. No obligation.

HERE IS YOUR JOB in AVIATION





We have hundreds of urgent requests for Embry-Riddle ground and flight graduates -- 40 times the graduates we had available could have been placed in the last 3 months. Never has there been such opportunity for you in aviation. Begin your career now. A few short months at Embry-Riddle and you're ready for a good job with best pay.

EMBRY-RIDDLE OFFERS

Complete training in minimum time for A&E Mechanics and all fundamental flight, specialist and technical positions ● Modern airline-size hangars, classrooms, shops and airplanes ● Experience gained over a quarter-century of aviation training ● Living facilities on the airport.

INDUSTRY NEEDS

Mechanics, technicians, specialists, engineers, pilots--many, many more men than all aviation schools together can supply. The shortage of trained personnel is becoming more acute. Get in on the ground floor... Embry-Riddle students are spoken for well ahead of graduation. Don't delay. Write for proof of job opportunities TODAY. Begin your aviation career at Embry-Riddle NOW.

Please rush me complete information on Embry-Riddle training and details of job opportunities for Embry-Riddle graduates.

Authorized training under the G. I. Bill of Rights

Dean of Enrollments - Dept. 84
Embry-Riddle School of Aviation
Miami 30, Florida

Name _____ *Age* _____

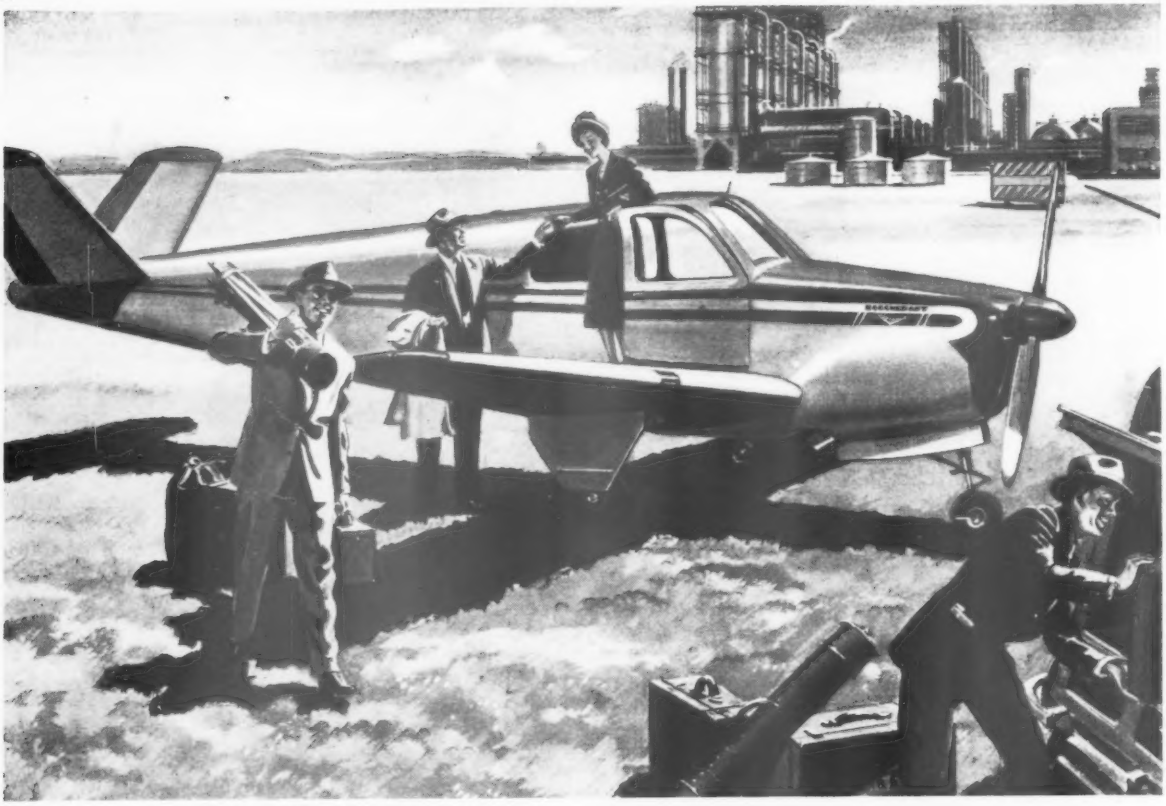
Address _____

City _____ *State* _____

CHECK ONE:
Veteran ☐
Non-Veteran ☐

Embry Riddle International
SCHOOL OF AVIATION
MIAMI 30, FLORIDA

TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD



"Does Bonanza travel pay?

It triples my business!"

... reports Robert Yarnall Richie, industrial photographer

"In my 4-place Bonanza the other day, my assistants and I flew the 250 miles from Tulsa to Madill in 1½ hours. Between 2 p.m. and sunset I completed a big oil refinery photographing job. Next morning we loaded my 500 pounds of equipment and hopped to Longview, 225 miles away, for an equally big job there.

"The net result was completion of two jobs in two days, plus several contacts for future business. Gas and oil cost $12.85. Two comfortable, restful hour-and-a-half flights instead of two days of hard driving on the road. Many of my clients are off regularly scheduled routes, and public transportation would not serve us.

"I know of a manufacturer in Los Angeles, a doctor in New York, and an engineer in Texas who, with their Bonanzas, have tripled the area they can see to personally—and at great personal profit. The Bonanza certainly *is* a revolutionary new kind of business machine."

Top speed, 184 mph
Cruising speed, 172 mph
Range, 750 miles

● A note on your company letterhead will bring an informative brochure on "The Air Fleet of American Business." Write today to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

BEECHCRAFT
BONANZA
MODEL 35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

AIR POWER: The Decisive Weapon

Air Force Day hails the striking power of USAF

By Maj. Gen. EARLE E. PARTRIDGE *Director, Training and Requirements, HQ, U. S. Air Force*

WHEN the American people through their elected Congress placed the Air Force beside the Army and the Navy as an equal partner in the National Military Establishment it was a recognition of four things. First, that air power in World War II had demonstrated its ability to destroy the industrial source of the enemy's military strength through precision bombing of strategic targets. Second, that air power had proved itself an essential element of all surface victories, whether on land or sea. Third, that in the destruction of Hiroshima and Nagasaki air power had established itself as the dominant military force of the modern world. And fourth, that the climate of international affairs demanded the development of a military establishment able to face the threat of aggression with its component forces properly integrated within a single defense structure.

Since September 18, 1947, when the United States Air Force came into existence, the judgment of the American people in taking this historic step has received the stamp of approval of two distinguished groups. Both the President's Air Policy Board and the Congressional Air Policy Committee examined the testimony of air leaders in every branch of American aviation. In their reports they set forth recommendations which if acted upon would assure the United States of possessing air power in its broadest sense adequate for the nation's defense during these critical times.

Subsequently, and with few dissenting voices, Congress passed the legislation necessary to put flesh on the bones of skeleton air groups and bring the Air Force-in-being nearer the 70 combat group strength determined as a requirement for United States air security today.

Thus, on the first Air Force Day celebrated by the newly autonomous organization, the United States can congratulate itself on having taken with decisiveness the steps required to begin the building of an Air Force adequate to preserve our democracy. It is to be expected, therefore, that the United States citizen will have an increasingly keen interest in his Air Force and in its capabilities to do the job he is paying for with his tax dollar.

The Air Force, like its sister services, is a vast organization of interrelated activities. Broadly speaking, it is comprised of a Headquarters, under which three combat commands and five supporting commands carry out their functions within the United States. In addition, overseas air forces are assigned to five of the seven unified commands responsible for the conduct of land, sea and air operations in regions of military importance to the United States.

The theme of Air Force Day, 1948, is "Know your Air Force better." In approaching an understanding of the components of the Air Force there is no better place to begin than with the command whose function most nearly represents the ultimate military application of air power. That command is the Strategic Air Command. In its application of long range bombardment formations against the industrial sources of an enemy's war strength it is capable of striking a decisive blow—decisive in the war itself and not merely in a campaign or battle. On this capability of air power to be decisive in war through independent action rests the status of the Air Force as a service co-equal with the Army and the Navy.

Today, the Strategic Air Command is composed of two major air forces, the 8th and the 15th of World War II fame. The groups of these air forces are located at 12 bases scattered throughout the country, and their mission is three-fold. First, they must be prepared to conduct long range air operations in any part of the world at any time. Second, they must be ready to carry out maximum long range reconnaissance over land or sea. And third, they must be able to provide combat units capable of intense and sustained combat operations anywhere in the world, employing the latest and most advanced weapons.

The standard aircraft used (*Continued on page 73*)

Strategy

By JARED HAMILTON

Like other industrial countries, Soviet Russia is vulnerable to aerial attack by strategic bomber.

THE mission of strategic bombardment is to destroy the enemy's industry—his *means* of making war.

If war ever came with Russia, what would be our own air strategy?

To plan a strategic campaign on paper is really a sort of game, like chess. We have our weapons—the pawns and key pieces. We define the rules, the objectives, and we have the opponent's forces under observation on our board, the Globe.

In this chess game the objective is Russia's strategic industry. The means of winning the objective are bombers and their weapons, bombs. The rules are our own because we need not be hindered by the frustrations of carrying out a plan. We need only lay it out nicely on white paper.

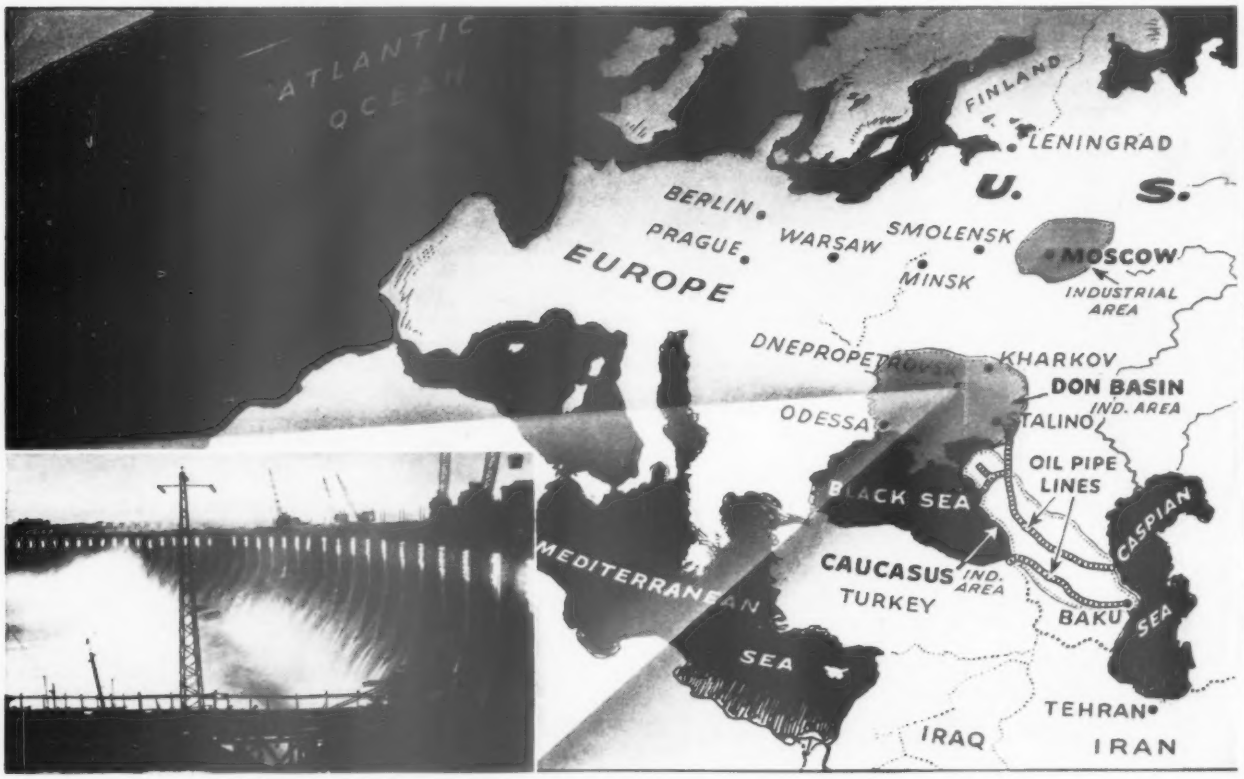
The objective is worth first study. Despite all the secrecy behind the Iron Curtain, we know a great deal about Russian industry. Even though much of the detail is missing, particularly since the havoc wrought by the Germans, we know the areas where Russian industry is concentrated.

Furthermore, we know that, given the location of strategic raw materials, it would not be practicable for the Soviets to have considerable amounts of heavy industry at other than the known locations. For raw materials and not the arbitrary whims of military planners determine the location of industry.

We know, for instance, that the Magnitogorsk Combine covers 27 square miles in the Ural River Valley, and that its furnaces turn out more than 2,000,000 tons of pig iron and nearly 2,000,000 tons of steel each year. As a by-product of the coking industry necessary to make steel, a considerable chemical industry has been established here. Magnitogorsk lies at the foot of Magnetnaya Mountain which supplies most of its ore. The coal for the blast furnaces of Magnitogorsk comes from the Kuznetsk Basin, 1,200 miles to the east, or from Karaganda, 600 miles to the southeast toward Lake Balkhash.

In this one paragraph we have described in general terms a high priority bombing target. A single successful photo reconnaissance mission could supply the detail. Experts studying these photo records could tell any military strategist which were the blast furnaces, which the strip mills. They could point out the chemical factories, and by careful analysis could make pretty accurate guesses as to what chemicals were being manufactured.

Even a child could point out that the railroads connecting Magnitogorsk to the Kuznetsk Basin and Karaganda would be prime objectives of an attack. Strategically-located bridges cross the Tobol and Ishim Rivers, for example, on the route to Karaganda. They cross both these and others on their way to the Kuznetsk Basin. Destroy these bridges and you cut steel production at Magnitogorsk. Keep them destroyed and you may ruin Magnitogorsk and begin to hurt other industrial cities of the Ural area. But you also do more. You reduce the supply of iron ore reaching the Kuznetsk Basin, for the



Against the Soviets

cars that haul coal to Magnitogorsk haul iron ore back.

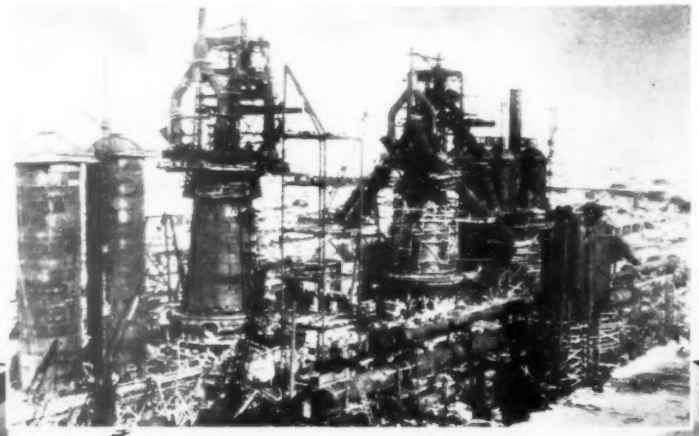
This is part of our game. We have reconnoitered a portion of the chess board. If we were actually within striking distance we might order some of our chessmen in a foray against Magnitogorsk. If we were successful it would be a rich prize—even at the cost of a few pawns. And as strategists we must reckon our losses.

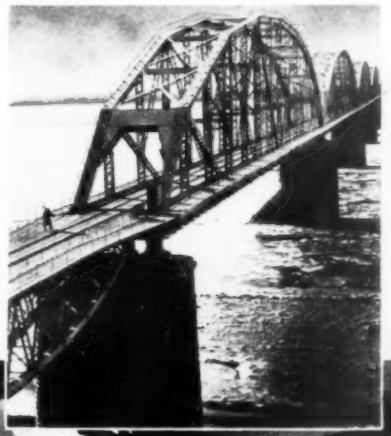
Coal is produced in more than 40 regions in the U.S.S.R. Where coal is, there can be strategic industry. The five main coal-producing areas are, in order of their importance, the Don Basin (or Donetz), north of the Black Sea where the Germans did heavy damage; the Kuznetsk Basin in south-central Siberia, the Moscow area, the Urals, and Karaganda. Other extensive coal fields have now been exploited and there is growing coal development in the Soviet Far East.

Yet the Don Basin probably accounts for 60 per cent of Soviet coal production and it is the most vulnerable to strategic bombing from the Near and Middle East. The Kuznetsk Basin produces perhaps 14 per cent of Soviet Coal, and Moscow and the Ural areas about six per cent each. Kuznetsk coal is of the highest quality and is easy to work, however, so there is undoubtedly a substantial and continuing shift of Russian industry to this inner Asiatic bastion.

Statistics are beautiful things to the air strategist. In 1937, Russia produced about 14½ million tons of pig iron, of which 48 per cent was produced in the Don

The U.S.S.R. is a continental bastion, hard to hit but within reach of modern bombers from bases in Europe and Asia. Specific targets of an enemy air force could be the Dneiper dam (lower left), Magnitogorsk blast furnaces (below) and Amur River bridge.





Red fighter factory hummed during war, producing planes designed by Alexander Yakolev. Today this factory probably is building Yak jet fighters, now operational with Red Air Force.

Basin and 19 per cent in the Urals. In addition, the Leningrad (4.3 per cent), Moscow (3.2 per cent), Gorki (3.7 per cent), and Kirov (2 per cent) areas would be worthwhile targets. The Soviets love statistics too, and though they may not be as fond of publishing them now as they were a few years ago, not even a totalitarian state can uproot its major industries solely for strategic reasons.

Heavy industry in Russia is like that everywhere else in this respect. But in another respect it has a totalitarian peculiarity that makes it more vulnerable to strategic bombing than industry in this country might be.

It is organized in great integrations known as combines. The new heavy industry centers, as well as the older ones in the Ukraine, Crimea and Rostov areas, consist of groups of factories organized into huge economic units—the coke-metallurgical-chemical combines. They are vulnerable.

Air strategists, furthermore, know where most of Russia's industry is located. They know that lathes, machine tools, and precision instruments are made at Moscow, Leningrad, and Gorki. Do you wish to knock out trucks and tractors in this little game? You could probably get a very large proportion of Russian production by hitting the Stalin plant in Moscow and the Molotov plant at Gorki.

Heavy trucks are made at Yaroslavl, Diesel engines at the Kolomna works near Moscow, and at Leningrad and Gorki. In the Urals, metallurgical and mining machinery is made at Novokramatorsk and Sverdlovsk. Locomotive and rail car works are at or near Gorki, Kolomna, Ordzhonikidzergrad, Bryansk, Kharkov. There are new factories at Novocherkassk, Orsk, and Ulan Ude. The largest new locomotive works are at Voroshilovgrad, and rail car works at Nixhne Tagil.

The engineering industry is concentrated close to the chief centers of metallurgy in the Urals and Ukraine.

An overwhelming proportion of Russian oil production is produced in the Baku oil field—it may run as high as three-fourths or more. The Grozni and Maikop fields produce most of the rest. Ten years ago, these three fields alone produced 93 per cent of Russia's oil. Much of Baku's oil is sent to the refineries at Batum, on the Black Sea; much of the rest is shipped via the Caspian and the Volga. A great new oil basin is under development in the Emba region, between the Urals and the Volga.

If modern armies fight on oil, then Russian oil production would become a major target. The refineries are especially vulnerable; one of the mistakes made in bombing Germany was in not hitting the refineries sooner. But oil production is also hit when transportation is hit, and when steel production is reduced.

The Soviet railroads are probably more vulnerable than those in the United States. The country is huge and there were only 62,500 miles of railway in 1940 compared with about four times that in this country. Siberia, especially, has few railroads. A few hits on strategic bridges might have devastating effect. Nor does Russia have the alternate highway systems to turn to in case of emergency. About 10 per cent of internal traffic is carried on the inland waterways, but hits on strategic locks and canals might have serious effects on this. The Volga is most important in the waterway system, carrying about a fourth of the total, while the northern and northwestern river-canal systems account for another third of waterway traffic.

Russian ocean commerce, except on the Baltic, Black and Caspian Seas, would be immediately bottled up by the mighty U.S. Navy, which is more powerful than all the other navies of the world combined. It is difficult to see how the Soviets could carry on more than a negligible ocean commerce, and that only at great risk.

The U.S.S.R. has 11 cities with populations of over a half million. All but Tashkent are east of the Urals, hence vulnerable to bombers based in the Middle East or in Scandinavia. Where the cities are, there is industry. Despite the heavy emphasis being placed on shifting industry to Siberia, we can draw the general conclusion that most of Soviet strategic industry is east of the Ural Mountains and, as we shall see, vulnerable to strategic bombing.

Now let us examine the weapons which might be used against this industry. Theoretically, the U.S. Air Force has, or soon will have three or four bombers operational which could do so.

The first of these is the B-36. It has a range which has been claimed to be 10,000 miles with 10 tons of bombs, but it is probably closer to 9,000. However, less than 100 of these planes are on order and they are apparently proving too slow for combat. If the B-36 were used, however, its combat radius could be assumed to be 37½ per cent of its maximum range—or about 3,400 miles.

Another possibility, though so far only a photo reconnaissance plane, not yet in production, is the Republic XR-12, a high-speed propeller-driven four-engined airplane which is not, however, intended as a bomber. So modified, however, it might have a maximum range of 6,000 miles, or a combat radius of 2,250 miles.

Last are the planes which would bear the brunt of any early offensive—the B-29 and B-50. Several thousand B-29s could be made available. Suitably modernized, they have ranges as much as 5,000 miles. (*Continued on page* 72)

ARCTIC AIR FORCE

Troop-carrying C-47 taxis for take-off shortly after snowfall at Fort Richardson, Alaska. Arctic operations create many unusual problems.

Alaskan flights build experience for polar operations.

By MAURICE RODDY

Aviation Editor, Chicago Sun-Times

NOT until World War II was the importance of the Arctic in the new Air Age generally realized. Exploration of the north, and new understanding of world geography, developed new polar concepts of air strategy.

The end of the shooting war marked the beginning of a mass winterization program of the USAF. Wartime flights had shown the great gaps in our knowledge of polar flying and emphasized that polar routes had placed approximately 90 per cent of the world capitals and industrial riches within a 5,000-mile range of each other. Only a day and a half of actual flying time separates Moscow and Washington.

Many years ago, the late Gen. William ("Billy") Mitchell warned that "He who controls Alaska, controls the world." Yet it was not until June, 1946, that the 46th Reconnaissance Squadron arrived in the Alaskan theater to pioneer operations under polar conditions, to test materiel and personnel, and to find safe procedures for year-round flying in the Arctic.

Since its first operational mission on July 21, 1946, from Ladd Field at Fairbanks, Alaska, the 46th has flown more than 5,000 hours and 1,000,000 miles, and has made more that 100 flights over the geographic North Pole and its immediate vicinity.

Other units, operating in the theater or ordered there on polar training operations, used the methods developed by the 46th. Among them were the 57th Fighter Group, the 54th Troop Carrier Squadron, the 415th Night Fighter Squadron, and the Air Forces 10th Rescue Squadron.

Pioneering work was also done by the 375th Reconnaissance Squadron. Thrice-weekly polar prowls are made by the 375th, according to Capt. Lester R. Ferris, leader of "A" flight. The B-29s take off from Ladd Field with a capacity load of 134,000 pounds on 17-hour missions. At take-off they carry 8,500 gallons of fuel, plus 14 crewmen, and fly level for most of the trip at about 10,000 feet—just over most polar weather. An altitude of 20,000 feet, however, is flown until the craft are north of the Alaskan mountain ridges.

These missions have shown up the perils of Polar navigation, where compasses may point in any direction, and where the lines of longitude converge so that near the Pole any conventional navigational system is useless.

New navigational methods have been developed, new facts have been discovered about Arctic weather, and new operational procedures have been worked out for planes flying in oil-congealing cold.

Arctic No-Man's Land is typical of terrain faced daily by flight crews of the northern squadrons. Safe landing and subsequent rescue would be virtually an impossibility here.

P-80s of the 84th Squadron are tied down at Ladd Field, near Fairbanks. They have red tails and red wing tips of Arctic combat planes.

When they arrived in Alaska, the first group—the 46th—found their maps marked with large white areas indicating "unexplored." They found that many landmarks shown on their maps were out of position. Closely grouped small islands were shown as a single land body.

In the normal course of "routine missions," squadron leaders carried out studies on terrestrial magnetics, gyros, Loran navigational aids, radar mosaics, radar targets, and map corrections and comparisons.

During the past year, a system of reference-heading navigation has been developed enabling squadron planes to fly anywhere and know their location to within one mile. To keep the track flown by the aircraft using this grid system, radar operators have learned to estimate wind, drift and ground speed to a fine margin even through an overcast. The margin of error in figuring the drift was narrowed to one degree while ground speed could be computed to within five knots.

Additional information learned through actual location of the magnetic north pole provided one of the most interesting studies. In more than 1,000 variation readings, the magnetic field was determined to be elliptical in shape, consisting of three poles. The major pole was determined to be on Prince of Wales Island, with two local poles on Bathurst Island and Boothia Peninsula. Former location of the pole was given on the lower tip of the ellipse on Boothia Peninsula.

Flying on top of the world exposes pilots to various new weather phenomena but most of them have concluded that polar weather "looks worse than it is." The air is generally stable and the greatest hindrances to flying are fog, snow, or ice haze.

There are few clouds and it is fairly clear in the winter, with no thunderstorms and little icing. During the summer, however, it is almost always cloudy. Alaskan weather is controlled by the location of a shifting high pressure area in the Pacific. Science has not yet been able to forecast successfully the location of the high pressure center.

When the ice pack is visible, its characteristics permit

R-5 helicopter of the 10th Rescue Squadron unloads Christmas parcels for dogsled delivery. Efficient air rescue is a key Arctic requirement.

Hot-air "treatment" is given to P-80s before take-off. Engine and cockpit must be heated before take-off as part of pre-flight routine.

experienced crews to estimate their latitude within a few degrees. More than half the flights are night operations. Electronic scopes scanning the snow fields below show ice cracks which enable crew members to determine wind drift. Since normal maps are of little use because of the convergence of meridians of longitude at the pole, the grid type of navigation is favored. This system is similar to the one used by artillery gunners for short range aiming control. Magnetic compasses on the B-29s are also masked so their readings will not confuse navigators.

In the winter, it is warmer at the North Pole than at Ladd Field. Very strong winds are prevalent in these areas. One mission reported hitting a wind over the polar cap with a measured wind velocity of 100 knots. Temperatures are frequently recorded indicating 90° warmer air at 3,000 feet than on the surface.

Flights of the 375th Reconnaissance Squadron have also helped to reduce the fear of the Arctic's vast distances, emptiness and extreme cold. According to reports of this long-range observation unit, the polar ice fields resemble the Arizona desert. The heavy granular snow covering the frozen ocean shows the same wind-blown drifts and ridges airmen observe over the hot waste lands of the U. S.

Other oddities of flying in the far north include 30-hour summer missions flown in continuous daylight, while winter missions are in continual darkness. Flying is held to a minimum during the fall and spring equinox periods because of the hazards of flying in continual twilight which make it difficult for pilots to estimate height and distances on landings and take-offs. Twilight also prevents reference to the stars for navigation.

Use of two or more of the four directional gyroscopes maintains straight flight. The same route is invariably followed to facilitate comparison of all types of information. From take-off, the 375th "polar prowls" head to Aklavik on the Arctic sea coast of Yukon territory, thence to Cape Manning on the southern tip of Prince Patrick Island, thence northward up the 123rd meridian to the pole. The return hop is by way of Point Barrow, Alaska.

In addition to the big bombers, squadrons of North American *Mustangs* and jet-propelled Lockheed *Shooting Stars* are participating in Arctic tactical operations. The jets are from the USAF's 94th "Hat-in-the-Ring" squadron commanded by Lieut. Col. Donald E. Hillman of March Field, Calif.

Since the jets are flown under much more unfavorable weather conditions than in California, several modifications are necessary. For —65° temperatures the planes are modified so that their GE-Allison J-35 turbo-jet engines can be started with the more combustible gasoline. Later they are switched to kerosene, the regular jet fuel.

Other changes include the use of new greases, cold weather packing around hydraulic units, and the installation of an electric heater- (*Continued on page 74*)

CURSE OF THE Jenny

The culprit, the JN4D of World War I, set a pattern of personal flying from which aviation is still trying to extricate itself.

Private flying is still hamstrung by the influences of an obsolete World War I trainer, Harvard experts believe.

This article is a condensation of a portion of the new book, "Personal Aircraft Business at Airports," by Lynn L. Bollinger and Arthur H. Tully, Jr., of Harvard University. Its startling conclusions should be studied closely by all pilots and aviation officials.

WORLD WAR I brought great advances to aviation but it also imposed handicaps from which the industry has not recovered after 30 years.

The First World War created aircraft manufacturing as an industry. It brought capital, engineering and production talent into aviation for a few years on an unprecedented scale. It taught thousands of young men to fly. And it made available thousands of training planes and engines to civilians at low prices.

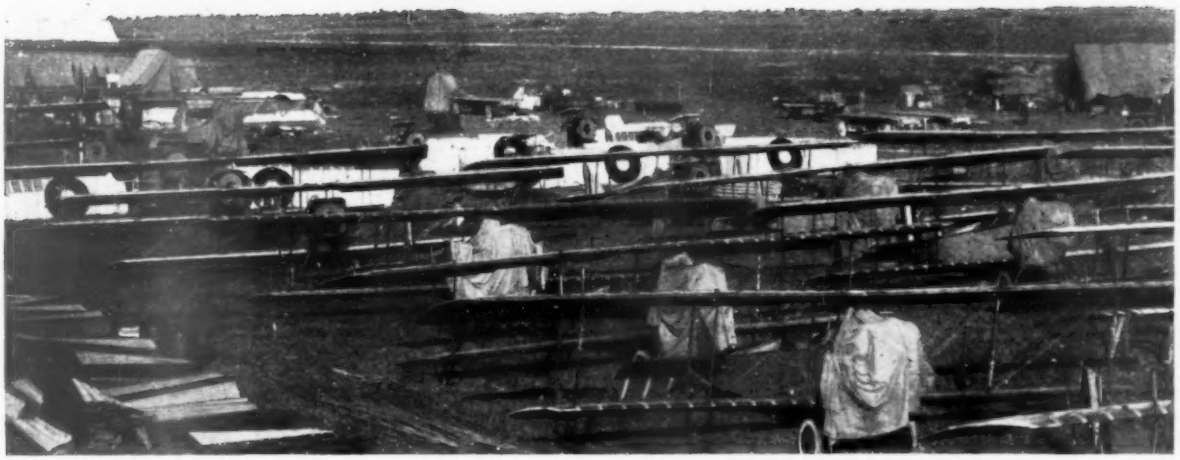
An estimated 1,200 surplus *Jenny* trainers were sold—more than the combined production of all types of private aircraft during the eight years following World War I. They permitted a volume of post-war flying far greater than would otherwise have been possible.

Yet they also "inhibited further development and first froze the personal aircraft industry into a continuing pattern which still appears responsible for economic limitations."

—All this is the gist of a significant new study, "Personal Aircraft Business at Airports," by Prof. Lynn L. Bollinger and Arthur H. Tully, Jr., which has recently been published by the Harvard Graduate School of Business Administration.

The report carefully documents the present-day light-plane situation as one part of a 348-page investigation of the financial and management problems confronted by fixed-base operators.

The surplus *Jennies*, Bollinger and Tully believe, were primarily responsible for the limitations of personal airplanes today, for the freezing of our airport pattern into



Surplus Jennies and their OX-5 engines glutted the aviation market for years and froze aviation into a continuing pattern.

huge outlying areas inconvenient to the centers of population, and for the development of unsuitable Civil Air Regulations based upon the military flying requirements of such unstable, heavy and slow airplanes as the ancient *Jenny*.

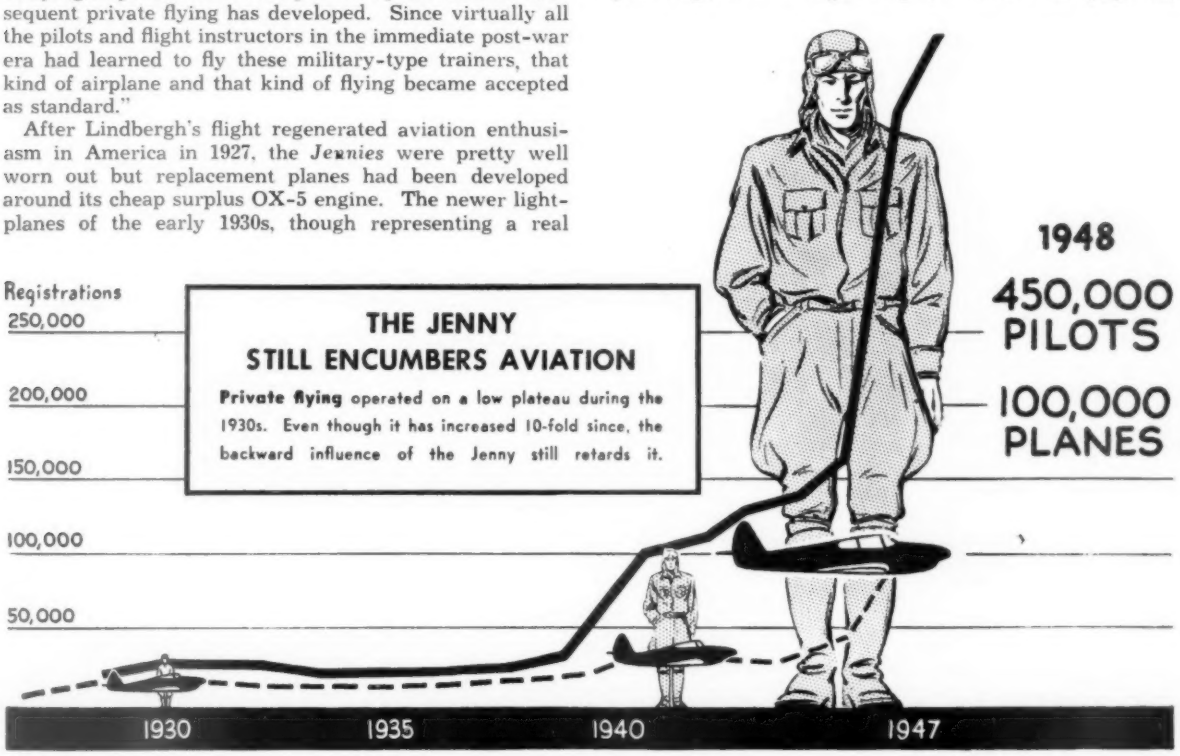
The surplus planes of the first World War were designed to train pilots to fly faster combat aircraft, the report explains. "To permit military-type acrobatics, these trainers were of comparatively heavy construction. Since the strength of wooden structural components was somewhat unpredictable, the airframe was made much heavier than had previously been characteristic. Aircraft of this type required large, specially-prepared landing areas, and for this purpose large outlying airports were developed.

"The surplus *Jennies* with their requirements for large, outlying airports thus set the pattern upon which all subsequent private flying has developed. Since virtually all the pilots and flight instructors in the immediate post-war era had learned to fly these military-type trainers, that kind of airplane and that kind of flying became accepted as standard."

After Lindbergh's flight regenerated aviation enthusiasm in America in 1927, the *Jennies* were pretty well worn out but replacement planes had been developed around its cheap surplus OX-5 engine. The newer lightplanes of the early 1930s, though representing a real structural advance over previous private planes, and doing the same job at less than half the cost, were still used primarily as cheaper and safer substitutes for the old 1918 *Jenny*. *"By 1948, this same type of plane was still the most widely used."*

"From a *functional* point of view," says the report, "these new light airplanes were essentially unchanged. Being designed primarily for the same military type of flight training and being limited to existing airports, these vehicles did not fit the basic needs of the personal transportation market much better than had their more expensive predecessors."

Authors Bollinger and Tully declare that the present-day four-passenger cross-country airplane had reached much of its current stage of development by 1923. Some improvements have been made aerodynamically, but 25 years ago a trim high-wing (*Continued on page* 64)



Visiting seaplanes lined the shores of Governors Island beach.

SEAPLANES came flying in from all over the east. They followed the Merrimack River up from Boston. They flew along Long Island Sound and up the Connecticut River. When they all showed up at Lake Winnipesaukee on a recent weekend for the first New England Seaplane Regatta, the 28 seaplanes and amphibians constituted the largest group of private float planes ever to assemble in the east.

The Regatta, sponsored by the Aircraft Owners and Pilots Association, began on Saturday when the pilots flew to Governors Island. There, planes were moored along a sandy beach with the aid of CAP cadets, and pilots and guests checked-in at resort hotels lining the lake front. After a "cold beer" reception sponsored by the Edo Corporation, participants attended a lobster dinner at which Lee Wulff, nationally-known sportsman, showed colored films taken on a float trip to Newfoundland [see "North to Newfoundland" by Lee Wulff, June FLYING, page 25].

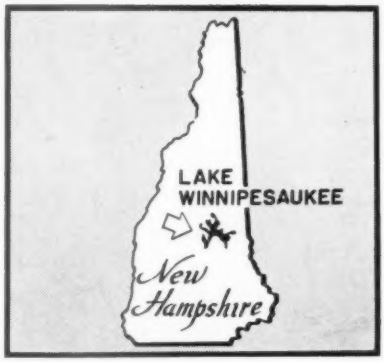
At the dinner, a Safe Flight stall-warning indicator was presented to M. Ratcliff of Camden, N. J., for coming the longest distance (410 miles) to the Regatta. The oldest pilot, Frank Scott, 48, of Mineola, N. Y., received an engraved plaque; and the youngest pilot, Burke C. Perlman,

PHOTOS By
HOWARD LEVY

Seaplane Regatta

Record-breaking New England meeting is held at scenic Lake Winnipesaukee.

Pilots arrive at the Weirs Seaplane Base. Seabee is part of six-plane delegation from the Mellor-Howard Seaplane Base, Ridgefield Park, N. J.



Lake Winnipesaukee was scene of regatta.

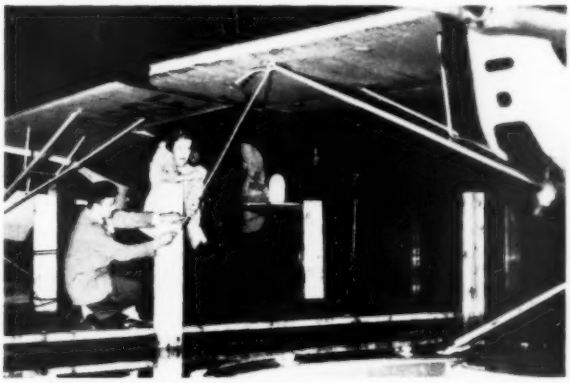
19, of Montrose, N. Y., an engraved cup. Walter Streychmans of South Norwalk, Conn., was chosen "the most handsome pilot" and received an engraved cup. For being the "prettiest woman pilot" Dorothy Schlaman received a cigarette lighter. A dance was held following the dinner on Saturday night.

Main event of the weekend was a Treasure Hunt, with pilots required to locate the letters E-D-O laid out separately in 10-foot letters on secluded beaches on three of the 360-odd islands. Seven planes, each carrying pilot and observer, participated. As each letter was found, its location was pinpointed on a chart of the lake. Clues in the form of a poem written by New York publicity man William Strohmeier were given to each pilot.

Treasure Hunt winner was a Grumman *Widgeon* (elapsed time: 18 minutes) owned by Melvin C. Wray of Taunton, Mass., and piloted by C. N. Chase. Their wives acted as observers. A trophy was awarded the winning crew by the Weirs Chamber of Commerce.

Among planes at the Regatta were *Cubs*, Super *Cruisers*, Luscombes, Aeronca *Champions*, Taylorcrafts, *Seabees* and a *Widgeon*. Largest delegation came from the Mellor-Howard Seaplane Base of Ridgefield Park, N. J., which sent six planes and 16 participants to the amphibious gathering. END

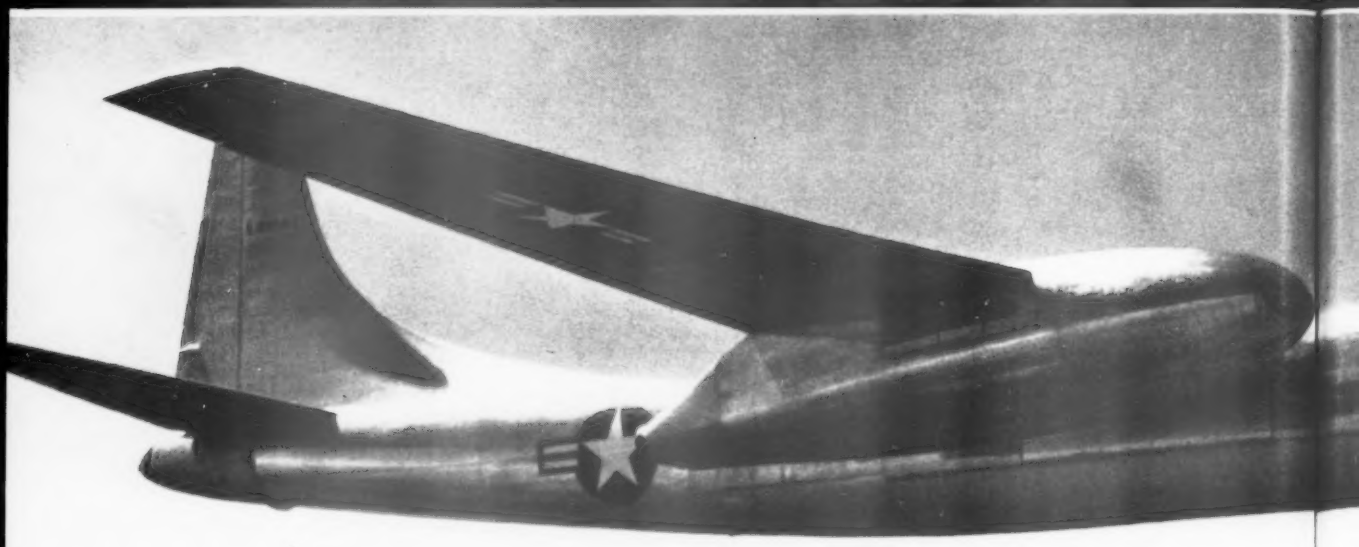
Winners in Treasure Hunt were C. N. Chase (left), M. C. Wray, and wives



Checking tie-down are Justin Davis and Marge Schlaman.

Irene Timony, 23, tests Winnipesaukee water Sunday morning.

Sports film taken by Pilot-Angler Lee Wulff is shown on Saturday night.



Convair's four-jet-engined XB-46 is a sleek and deadly warning of things to come in combat planes. Still in test stage, it contrasts markedly with the four-engined Liberator bomber of World War II, made by same company.

Jets in Combat

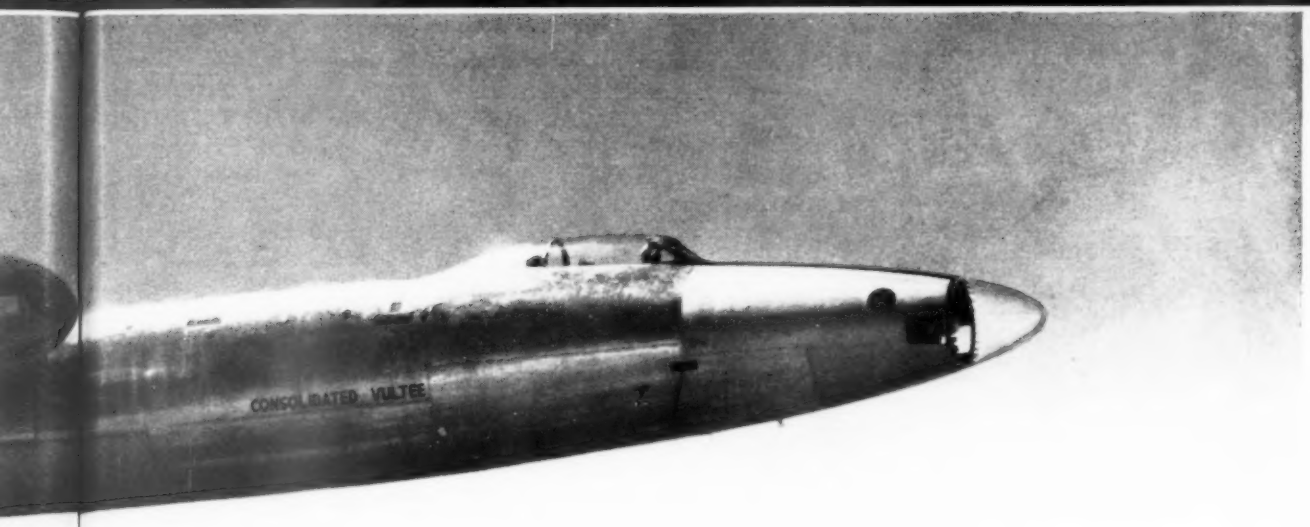
WHEN the first German jet fighters came swooping into the Allied bomber formations and covering fighters in the latter part of World War II, they spread havoc and consternation. The Messerschmitt Me-262 and Heinkel He-162 turbo jet fighters, and the Me-163 rocket fighters were at least one-third faster than Allied aircraft equipped with reciprocating engines.

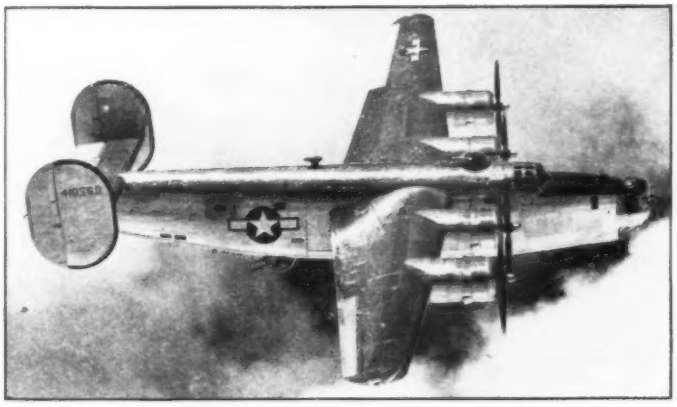
A handful of Me-262s would attack a much larger formation of *Lightnings* or *Mustangs* flying fighter cover and almost invariably knock out several, scattering the rest. And yet, within a short time and despite the much slower Allied plane speeds, the German jet aircraft had been fairly well countered.

The reasons why are worth close scrutiny in considering the tactics of modern jet planes, though the information we have is sketchy enough. Actual combat experience with jets is comparatively small and there is little literature on the subject. Indeed, the same situation holds pretty true for peacetime operations of jets. Nevertheless, certain lessons in the German jet fighter experience during the final stages of the past war stand out.

It has been said that Hitler's decision to convert his Me-262s into fighter-bombers rather than leaving them to attack the Allied strategic bombers cost him the war. It was a major blunder, certainly, and it took the pressure off our strategic bombing campaign. Nevertheless, the U. S. and British bombers and their covering fighters did adopt tactics to deal with the jets which proved reasonably successful.

German practice was to use their superior speed to approach from 500 to 1,000 yards above their quarry, from behind, and out of the sun whenever possible. They operated under precise radar instructions from the ground. The formation leader chose the most favorable meeting situation, considering the weather and other conditions, and advised the fighter-director officer on the ground where he desired to make contact. He had the choice because of his superior speed. It was up to the ground controller, then, to vector the group to the exact spot. This was especially important to night fighters.





The Liberator was a fearsome weapon in the past war, but compared with the performance of the new jet bombers, like the XB-46 above, it is too slow, can't operate at altitude, is over-manned, under-bombed.

After approaching from behind, the jet formations would release a heavy burst of fire and continue on over the formation. Ordinarily they could do this only once, for the formation broke up immediately, seeking safety by scattering, heading for the nearest clouds, and so forth. They could not, of course, outrun or out-dive the German jets.

These German tactics were very successful at first. But then they began to go slightly sour. Realizing they could not outrun the Germans, the American and British pilots began to outmaneuver them. When the jet planes had almost approached within range, they would close their throttles and pull up or turn sharply. The much faster jets could not follow and by the time they could turn they had frequently lost sight of the scattered planes in the Allied formations.

Then the Allies began shooting down a few jets on their own. These were mostly during take-off or landing, at first. The Me-262s had fairly short range and were clumsy and unstable at slow speed. Surprise attacks on German jet bases had good results until the Germans increased their antiaircraft defenses.

The Allies began to gain confidence, and when the jets flew over, instead of scattering, every plane in the formation began shooting wildly at them. A good many German jet planes were damaged or shot (*Continued on page* 54)

SEARCH FOR A LOST PILOT
SEARCH FOR MISSING PLANE CENTERS IN FOREST COUNTY
RAUGUS OR WARREN COUNTY AREAS sometime Sunday
TWO FAMILIES REPORT THEY HEARD CRASH
BIG REWARD OFFERED FOR INFORMATION
LOCAL POSSE IS OUT
$1,000 REWARD
to any person furnishing information leading to the discove
WARREN TIMES-MIRROR
Tip From Endeavor Leads to Discovery Of Flier and Wrecked Plane Missing A Week
Times-Mirror "Ad" Leads Searchers To Lost Plane
Intensive Search Comes To End When Searchers Locate Pilot and Craft At Quess

Plane was discovered in dense woods near Endeavor, Pa. Wreckage was barely visible from air, though only 600 yards from the nearest house.

The plane was missing. That's all the family knew. No Government agency had the responsibility of finding it.

By ROSEMARY S. PAINE

"YOUR BROTHER isn't back from his east coast flight! What shall we do?"

Mother's tense words one Monday noon launched me on a strange 10-day search which I would previously have considered fantastic in this modern age. My brother had left a Massachusetts airport on Sunday. That was our last word. He was not on flight plan. We knew only his ultimate destination—Chicago. He had disappeared.

Our first impulse was to contact Governmental search agencies. Our family didn't realize how woefully inadequate are provisions for such searches. We knew that time was important, that we must take immediate action. But there was no other information available. We knew only that it was urgently necessary to find him.

The suspense-filled story of our experience may serve as a guide to other persons in similar situations. In some cases, it may save a pilot's life if action is prompt and if searchers evade some of the pitfalls which we encountered. Here is my experience:

Phoning friends in Massachusetts, I discovered that Dick had left Sunday afternoon, intending to reach Chicago sometime Sunday night. They didn't know his airport of departure. I rushed three long-distance calls to airports in their vicinity, finally learning that he left at 3 p.m. Sunday from a field near Northampton, Mass. I was told it started to rain shortly after his take-off and continued raining until well after dark. I phoned CAA Airway Communication in Chicago, giving type aircraft and license number, but only uncovered the fact that no flight plan had been filed. Briefly, I informed the agency

that the aircraft was long overdue and unreported, and asked them which branch of CAA to contact next. Their reply indicated that aircraft not on Flight Plans were not the CAA's responsibility. I called a local airport operator and asked his advice. He had none, considering no Flight Plan had been filed. I called the CAA Regional Office, which asked the same question about Flight Plan. I told my story to three secretaries and found all three Inspectors out of the office. By now, late Monday afternoon, it was 24 hours since Dick's take-off. I had been working four hours and nothing had yet been accomplished. One hour later, one of the CAA inspectors called back. He asked the inevitable question about Flight Plan, explained its virtues and finally agreed to place an alert notice for this aircraft on the CAA teletype. He also asked if I had alerted the Air-Sea Rescue Division of the Air Force. I had not because I didn't believe they would listen to an individual nor did I know where to contact them. I understood the inspector would take this step.

Someone in Massachusetts had heard Dick mention Albany as his first stop, but the Albany airport had reported that Dick's plane had not landed there. From the Massachusetts end, friends were able to contact the Governor and have the National Guard sent out.

I called the Illinois State Police in an effort to alert the Massachusetts and New York State Police. Leading newspapers from Cleveland to Boston were asked to assist in obtaining information. I phoned the New York CAA district heads, and the ex-National Commander of the Civil Air Patrol, who promised assistance.

Late Monday night, in desperation, I called the Albany airport myself to check the report that our plane had not been there. For 10 minutes on long distance, I was treated to a dissertation on Flight Plans, received the information that our plane had *not* been there on Sunday and that, even more discouraging, *no request for information regarding this ship had been noted on their teletype.* This was six hours after I had been promised that the teletype would carry it immediately. Upon my specific request, Albany took the time to recheck the records and confirm the "no record" report.

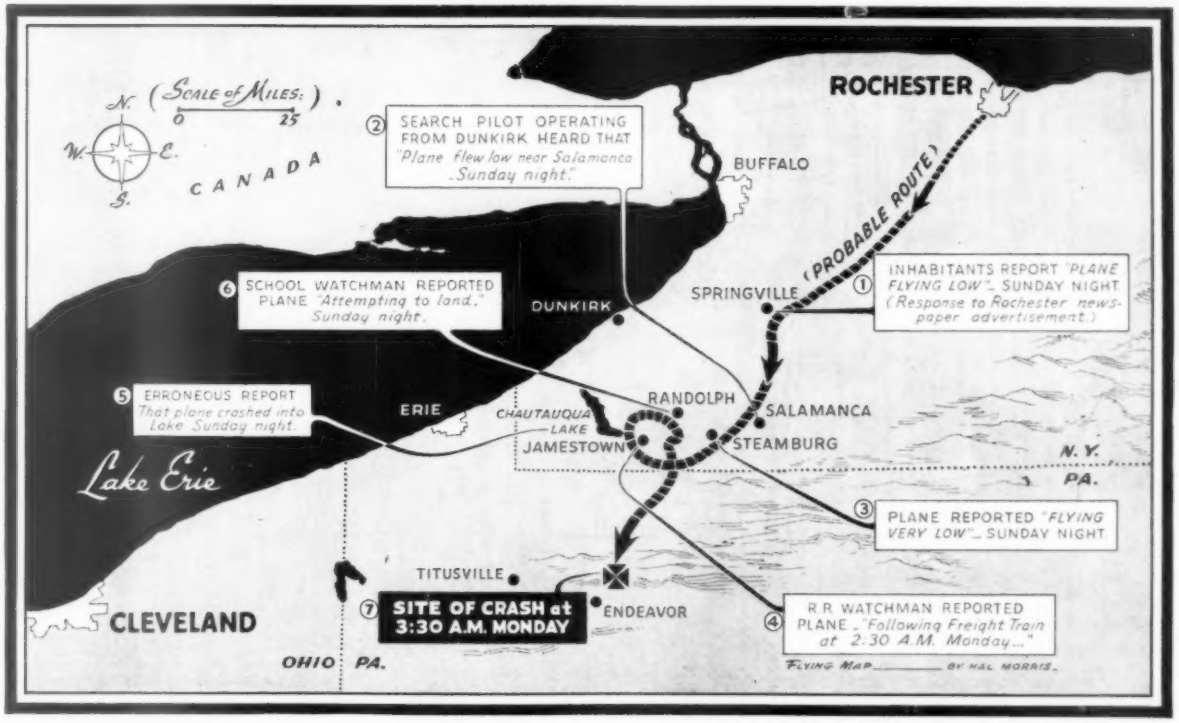
At noon Tuesday, CAA reported that Dick's plane *had* stopped at Albany Sunday afternoon for both gas and weather information. We had called Albany three separate times long distance without getting this information, yet there was a record there of his passage. Dick had definitely talked to the Albany Tower for both landing and take-off instructions. He had also given his name to the weather station when he received forecast information. It was now possible to concentrate our search farther west.

Chicago CAA reported Tuesday that Dick had continued from Albany to Rochester, N. Y., late Sunday afternoon in poor weather. Rochester said he arrived there about 7 p.m. and waited five hours for the weather to clear. At midnight he took off again. (*Continued on page* 68)

IF YOU HUNT FOR A LOST PILOT

1. Obtain plane's license number and description.
2. Establish intended route, time and place of take-off.
3. Give CAA and Air Force Sea-Air Rescue information.
   a. Nearest CAA office can be located through airport managers.
   b. Air-Sea Rescue can be contacted at: Westover Field, Mass.; Morrison Field, West Palm Beach, Fla.; Selfridge Field, Detroit, Mich.; and Hamilton Field, Calif.
4. Establish headquarters at last-known point of contact with plane. Contact state and local police, forest rangers, game wardens, etc.
5. Wire all outlying airports along route, within aircraft's range, offering reward and requesting information.
6. Obtain local radio and newspaper publicity, moving publicity from area to area along plane's probable route. Include purchase of full-page newspaper ads. Give all information about missing plane except probable time of day the plane would have been seen or heard.

PLANE'S PROBABLE ROUTE



Three points of a tie-down are both wings and the tail. Tail should be tied by handle, wings by rings or at strut fittings.

Tie-down knots should be simple, yet safe, like the bowline knot or midshipman's hitch. Both are easily tied and untied.

HOW TO Weather the Blow

Safe tie-down is not a slipshod matter. Here are tips that could save you some hefty repair bills.

PHOTOGRAPHS BY WALTER STEINHARD

THERE he stood beside his new *Cub*, the most disconsolate man in the Middle West. Two thousand bucks worth of battered fuselage and wrecked airplane. His repair bill was already written across his wry face.

Why?

He didn't tie the plane down. Sure, he chocked it. But he was only leaving it for half a day—and he was certain someone would take care of it in case of wind.

But that storm blew up quickly. And there was the *Cub* upside down. A beautiful, safe, dependable plane marred because he was too careless to take reasonable precautions.

The process of tying-down an airplane is simple, though there are a few tricks to it.

If you want your plane to weather the blow in the blustery fall days to come, here are a few things to remember.

In the first place, your tie-down is only as good as the rope you use. Be sure it's Manila hemp or nylon. Sisal rope isn't as good; it's only 80 per cent as strong as Manila. If your plane weighs up to 2,000 pounds the rope should be at least half an inch in diameter; if over 2,000 but under 4,000, use $\frac{5}{8}$" rope. And remember the rope must be in good condition. It rots rapidly if left in sun and rain.

When you tie down the plane, use the natural resilience of the rope—allowing about an inch of movement. Don't forget that too much play will cause the plane to tug against the ropes. If you tie the rope too tightly, stresses will be transferred immediately to the plane's structure.

A couple of things to remember are that metal thimbles spliced into the rope will reduce wear at anchor ends, and that your knot must be safe. Two excellent knots are the bowline and midshipman's hitch.

Above all, moor at three points: each wing and the tail. And moor to rings clamped to strut fittings when possible. Don't tie to the strut itself.

Obviously, the best tie-down job in the world is useless if you don't have good ground anchors. They should be able to withstand a pull of at least 2,000 pounds. You can use guy wire anchor screws (like those of utility companies) almost anywhere except in sandy soil where they're liable to work loose. Regardless, give the tie rods and chains a good coating of red lead or other protective paint to prevent rust and corrosion. *Don't depend on stakes.*

One of your aims in tying down the plane should be to decrease the angle of attack. That can be achieved by lowering the front wheels into holes, or by putting a support under the tail wheel in order to level the wings. If you use the tail support, be sure it's firm and won't be moved by the wind.

Some additional pointers may help:

(1) Attach spoilers along the (*Continued on page* 32)

Allow about an inch of slack and remember that Manila rope shrinks when wet. Loop surplus rope to prevent lashing, and chock the wheels.

MAKE YOUR OWN TIE-DOWN FACILITIES

In emergencies, ingenuity helps. Here tail wheel is wedged into place and elevated to decrease lift.

In rough country, or when ground is frozen, tie down to saplings. They are usually strong-rooted.

Tie near base of strongest saplings. It would take practically a bulldozer to root out this young tree.

Dig holes for wheels if there are no tie-down facilities. This automatically elevates the tail, too.

Don't do this. Rope is frayed and rotted, it is tied to a strut; has too much slack, and is moored at the wrong angle.

wing tops. It's easy to make them of a 2"x4", bored so securing tapes won't slip. They should be located about a foot from the leading edge—and should extend the length of the wing.

(2) Chock the wheels fore and aft. Use either double chocks made to fit the wheels or separate chocks in front and in back of each wheel. And don't overlook the need for chocking the tail wheel securely.

If the wheels are chocked properly you don't need to set the parking brakes. So chock properly; with locked brakes you can easily damage your brake system.

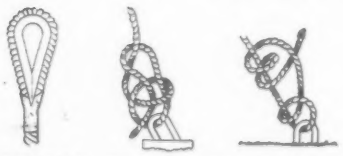
(3) Lock the control surfaces but use some device to warn the pilot that the locks are secured. You can use streamers, weights or a rope stretched to the ground anchor. If controls aren't locked they'll bang against the stops in gusty weather. Fasten the ailerons and rudders in neutral and keep the elevators parallel with the ground.

(4) Check the plane next to yours. If it's not securely tied move your plane to a safer place.

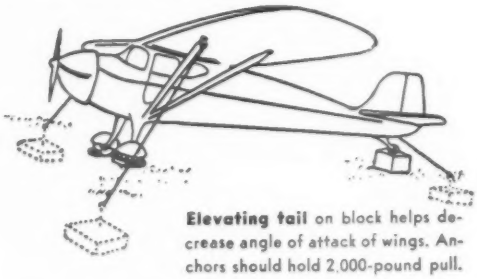
(5) Be sure to cover the windshield, canopy, pitot tube and engine.

The foregoing tips, prepared by the now disbanded Aero Insurance Underwriters, constitute an introduction to the tie-down problem. No one is sadder than the pilot whose plane has been wrecked on the ground in a storm. And in most cases, no one deserves less sympathy. END

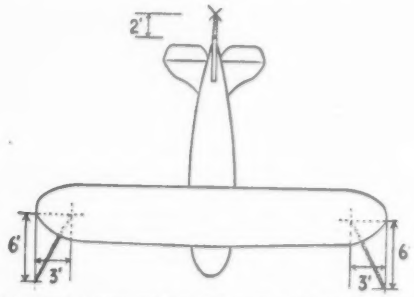
TIPS ON MOORING YOUR PLANE



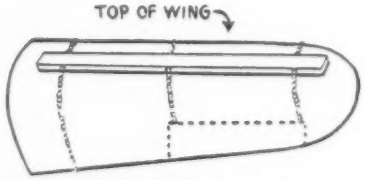
Thimble (left) spliced into ropes will reduce wear at anchor ends. Bowline knot (center) and midshipman's hitch (right) are safe knots and easy to tie.



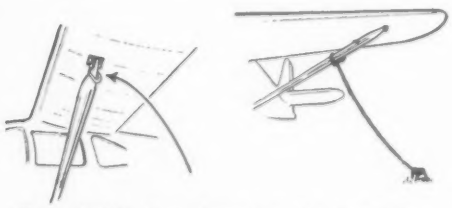
Elevating tail on block helps decrease angle of attack of wings. Anchors should hold 2,000-pound pull.



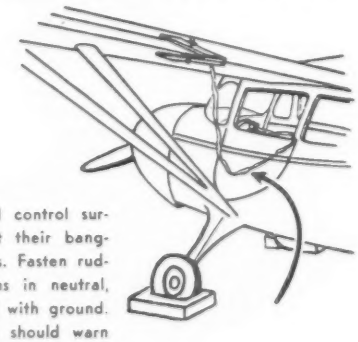
Moor at three points. But note that strut fittings of some planes will not withstand the angular pulls shown above. In such cases, anchor directly beneath.



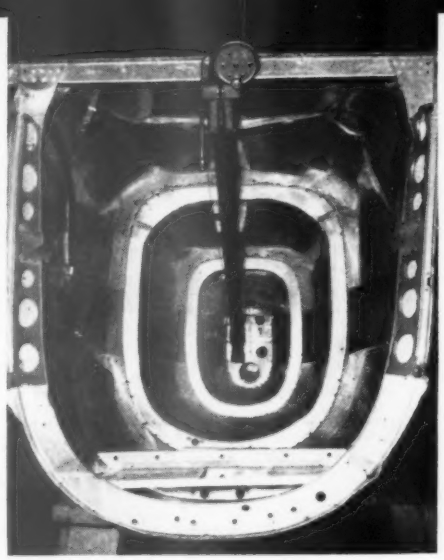
Lash two-by-fours to top of wings to act as spoilers. Place them one foot from the leading edge.



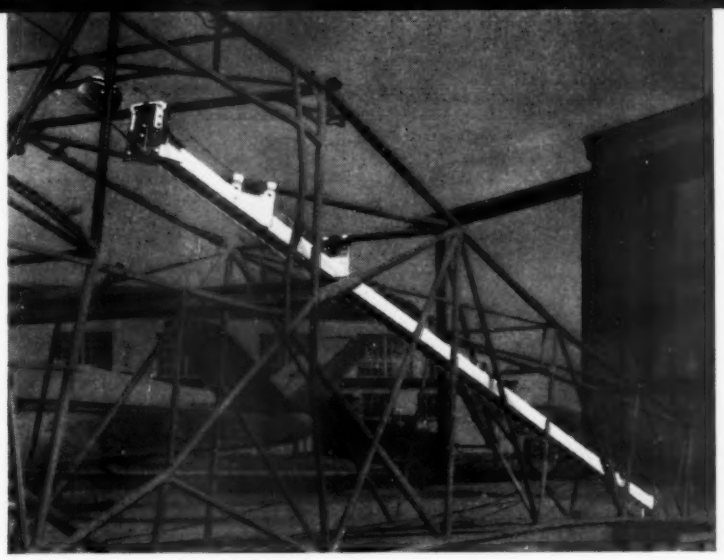
Use suitable rings clamped to the strut fittings wherever structure permits. Never tie as at right.



Lock or tie all control surfaces to prevent their banging against stops. Fasten rudders and ailerons in neutral, elevators parallel with ground. Streamer or line should warn pilot that controls are locked



Safeland is easily installed in Cessna fuselage.



Taylorcraft installation shows how channel for weight attaches to plane's frame.

Built-in Airstrip

Moving weight on a track improves landing performance of lightplanes.

By LAWRENCE KEIL

Public Relations Director, Chicago & Southern Air Lines

A SIMPLE 21-pound device will enable a Cessna 140 to land in less than 150 feet. I saw it done; and a few minutes later, with a minimum of instruction, I flew the same plane, landing it in about 200 feet on the first try.

The device is called "Safeland" by its inventor and is already CAA-approved for Luscombes, Cessnas, Aeroncas, and Stinson 10As. Little more than an auxiliary stabilizer, it nonetheless gives the closest to tricycle gear performance in a conventional geared lightplane I have seen in many years of flying. It works by having a lead weight move from front to rear to make the plane tail-heavy.

The Safeland's purpose is to increase the safety factor of lightplanes on rough or muddy fields and at high altitude airports. Most important, it reduces the nose-over dangers to a minimum and cuts down the hazards of short field landings, long a bugaboo to the novice pilot.

So I could thoroughly test the unit, Aircraft Devices Company, located at Central Airport, Camden, N. J., manufacturers of the Safeland, had their test pilot, Frank Pearson, a 3,000-hour veteran, fly the company's Cessna 140, NC 72766, to Sky Harbor Airport, Northbrook, Ill. Pearson is also pilot for RCA, flying their Beechcraft AT-11 instrument-laden flying laboratory. Aircraft Devices also has Luscombes, Taylorcrafts, and Aeroncas equipped with the Safeland unit.

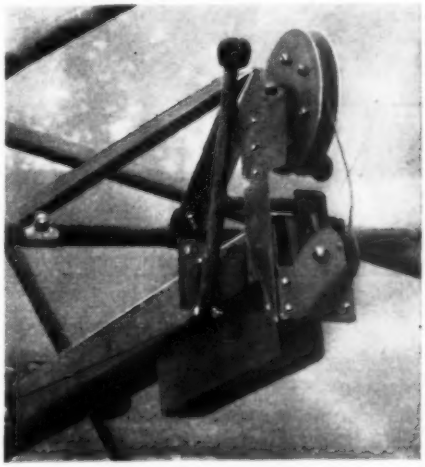
First, Pearson and I flew the plane with the Safeland in the forward, or inactive position. Landings, take-offs and normal flight attitudes gave no hint that any special device was in the craft.

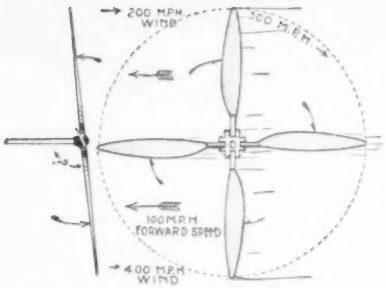
Next, with the Cessna on the ground, the Safeland was put in the tail position. The lead weight makes quite a noise on the ground, and to the uninitiated sounds as though the tail assembly takes leave of the rest of the plane.

On the base leg preparatory to landing, we had to use about two turns of the normal stabilizer to make the plane more tail heavy. On final approach Pearson indicated his intended touchdown spot and added, "Watch this."

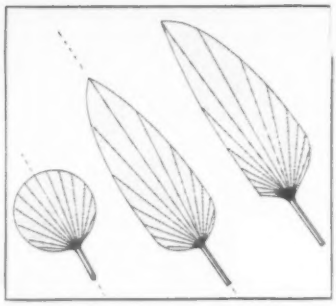
The spot was the near end of the runway, (*Continued on page* 76)

Safeland controls fit snugly in, T-craft cabin (above). Close-up of device (below) shows lead weight, release handle, spool.

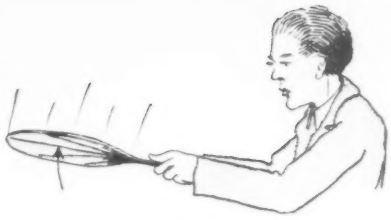




A basic helicopter problem is that the blades move at unequal speeds in the air.



A fly's wing resembles the structure of a palm leaf fan. Both can give lift.



Substantial lift can be obtained by beating the fan against the air. Moving it edgewise through the air, however, gives very little lift.

Roadables able to land and take off at a 45° angle—can flapping wings provide them?

BILL STOUT SAYS:

We Need a Lightplane Revolution

MY PREVIOUS outlines in FLYING have analyzed the private plane owner field to find out the successes and failures of the small plane to date.

My conclusions have been that the utility of the present small flying craft is not enough to justify a really wide market and that present types are useful only in certain communities where the local conditions—mountains, deserts, or water barriers—make their use practical for more than just fun.

This is too expensive a hobby to last long as mere fun. There must be a sincere solid business reason for owning and operating a plane just as with a motor car. Today this necessity is not broad enough to make a universal market.

The motor car prospers because of *volume desire* in line with reasonable price. The private plane neither creates the desire on a large enough scale nor meets the necessary price, largely because of the small scale desire as expressed by those who do actually buy.

No plane or air vehicle now offered or proposed has any prospect of creating a desire for 1,000 vehicles a day, and yet that is the minimum that we automotive people would call actual "production" to meet reasonable first cost and service costs.

Conversely, if we are to develop this market we must find out how to make the kind of an air vehicle that will create this desire, which means that a lot more things must go into the airplane than we have even dreamed of putting in to date.

Let's see what specifically could be done to present planes to make them meet the need and create a new quadrupled demand:—

WINGS. Design, material and fabrication are already a high art and only a very small percentage of improvement is left.

FUSELAGE. Even if the whole airframe were but half the present weight the percentage of gain in the weight of the complete plane would be little affected.

LANDING GEAR. Going to more weight and more wheels rather than less; more mechanism, more cost. Present types not adaptable to roadable use.

INSTRUMENTS. Getting more instead of less. Most of them are aimed to direct the pilot to do, on fear of his life, *things that the plane itself should do* without pilot direction.

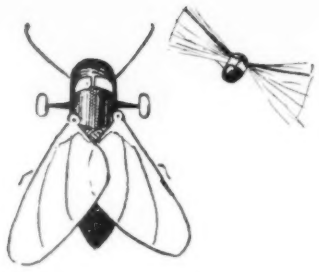
POWER PLANT. Still too heavy. Should be able to double its power for even a few seconds at a time for booster take-off and power landing.

PROPELLING MECHANISM. Thrust should be at centers of drag and weight, with no nacelles or protuberances on the wings to create extra drag. This should be done without jet propulsion which will not come cheaply for a long time. The propeller, as we have it now, is not the final answer. Too expensive and complicated and filled with more and more gadgets. (Like inventing rubber gloves for leaky fountain pens.)

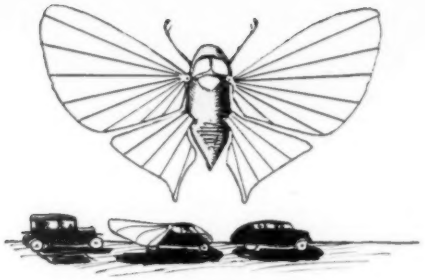
MATERIALS. No radically (*Continued on page* 50)

RESTLESS INVENTOR

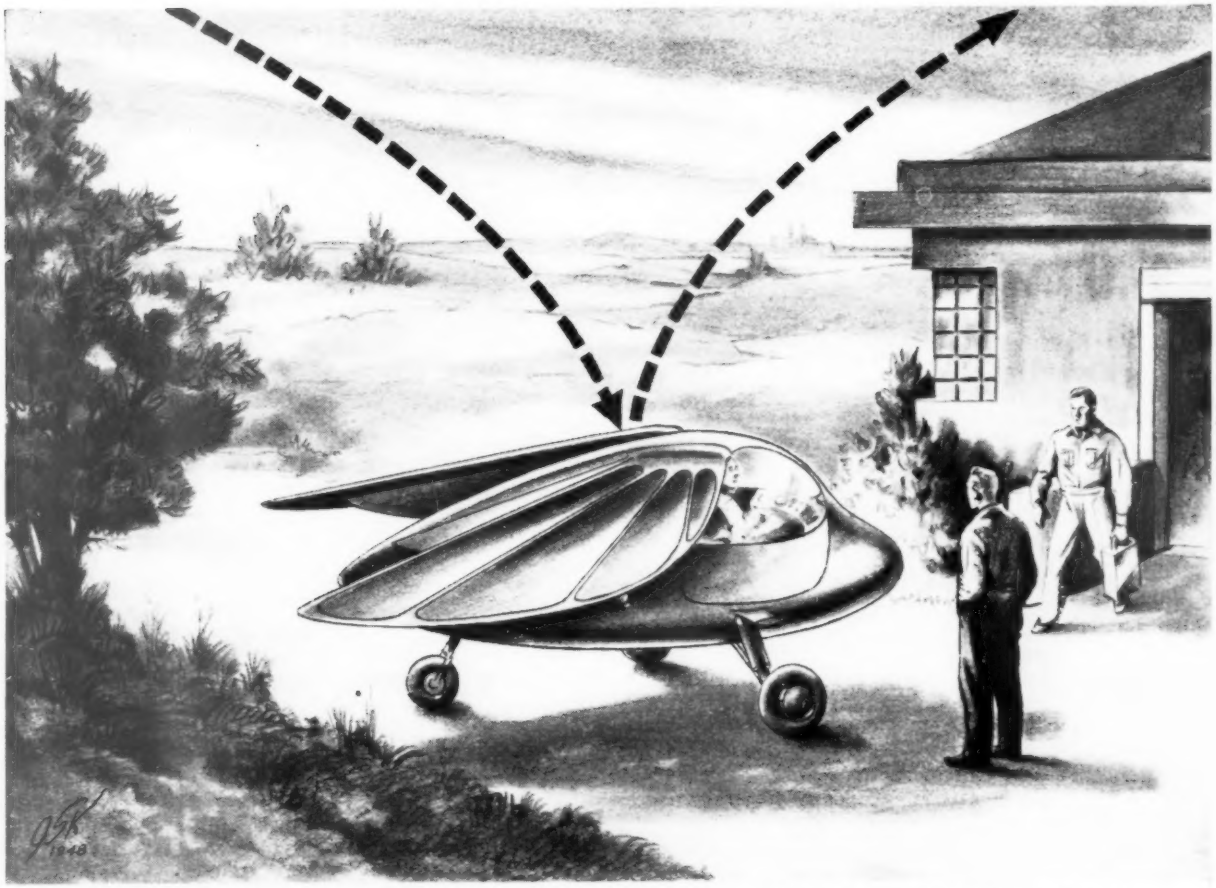
Unorthodoxy is the key to Inventor Bill Stout's attitude. This is the third in his series of articles calling for a completely new approach to the personal plane—an approach that he feels must result in a safe airplane completely at home on land or in the air—what he calls a "universal vehicle." Stout doesn't profess to know the answers but he believes they exist in some form.



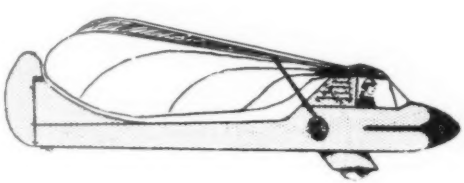
Revolutionary craft might look like a fly, author suggests. It would have short, fast-beating wings.



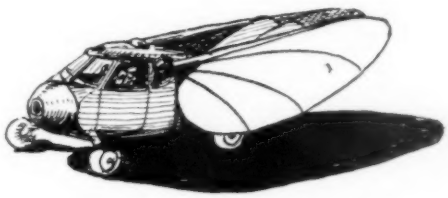
Safer idea might have wings like a butterfly, permitting pilots to glide to the ground if motor quit.



Nearly vertical landing and take-off characteristics would be a must for universal vehicle. It must be widely useful even when not roadable, and to do so it must be able to land and take off from small back yards. Author recommends climb out at 45° angle.



Plane modeled after four-winged dragon fly or ant lion would have long fuselage, thin, narrow wings.



Wings must fold, whatever the design, author believes. No parts should be left behind at airport.

THE *Luscombe Observer-90*

Luscombe Observer 90 was designed for military liaison use but is being sold as a personal plane. Note how big side windows open up. The plane altogether has 33 square feet of Plexiglas, which provides amazing visibility but helps make it noisier than most planes.

By MAX KARANT

Assistant general manager and editorial director, Aircraft Owners and Pilots Association

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Approved Type Certificate are flown. The author is not a professional test pilot. He evaluates each aircraft through the eyes of an average private pilot who flies an airplane either for business or sport.

THIS is a personal plane that never was designed to be a personal plane. Its name is a literal explanation: it was designed solely as a liaison or observation plane for the Air Force. By a roundabout series of circumstances, the *Observer* has found its way to the personal-plane market. It happened something like this:

Some time ago the Air Force let it be known that there soon would be another competition for liaison plane designs. Naturally, all the lightplane manufacturers want a chunk of that business, so they went to work on designs that would meet the basic Air Force requirements. The main competition has not yet been held, but there has been enough time for several liaison designs to take shape.

During the course of this design work, however, the Air Force decided to stop buying any more expensive liaison types like the Convair L-13 and Boeing L-15 (reported to cost about $27,000 each). Instead, Air Force officials decided, they would buy off-the-shelf personal planes from now on, planes that had been tested thoroughly, had been issued CAA type certificates, and could be bought at a more reasonable price.

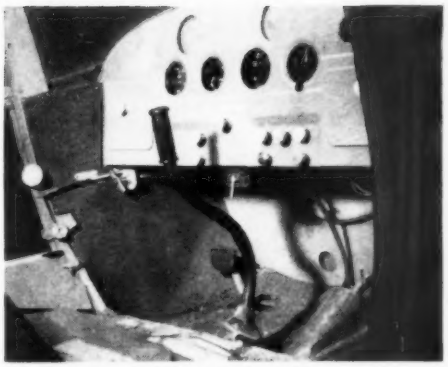
With that major change in policy, the Air Force started some-

thing. Nearly all the personal-plane manufacturers have at least one "standard" design, fully certificated and ready to be bought off-the-shelf. One such airplane is the Aeronca L-16, a number of which have been delivered to the armed forces already. The L-16 is nothing more than an Aeronca *Champion* with a 90-h.p. engine. And you've probably heard of the Piper PA-11 souped-up with a 90-h.p. engine; it's on the commercial market, all right, but it's really intended for the military market. The Luscombe *Observer*, however, had to be especially designed, because the Air Force said it wants tandem airplanes only, and Luscombe (unlike Piper and Aeronca) did not have a tandem already on the market. Result is that the *Observer* is actually a true military design being sold commercially, instead of the other way around like the Aeronca and Piper.

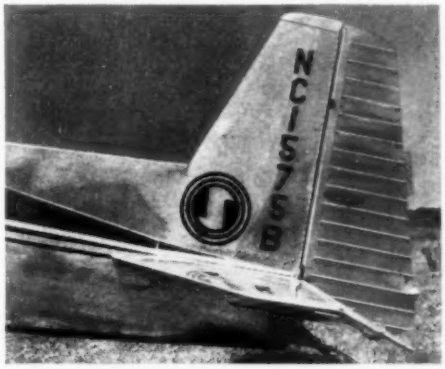
If you didn't already know it, you soon discover that the *Observer* is not like any other personal plane. First, it's got more window area than you've ever seen before (33 square feet of Plexiglas). The passenger in the back seat sits almost entirely out in the open. His head sticks up into a Plexiglas bubble which enables him to see in all directions, including over the top of the wing. The pilot in the front seat has windows all around and above him. He can see in all directions except straight down and ahead over the nose. You almost expect to find a window through the engine compartment.

Nearly all of this transparency opens up. The passenger (or, more accurately, the observer) can open a large window on each side of him in flight. Each window latches to the underside of the wing's trailing edge. And each window was designed to permit easy use of a K-20 aerial camera, something the average private pilot hardly ever takes out for an afternoon of snap-shooting. The pilot, too, can get plenty of air. The large windows on each side of him can be opened in flight. Not all the way up; just about 30° outward.

Result of all this should be obvious: if your girl friend is supersensitive to noise, don't take her for a Sunday afternoon flight in an *Observer*. While this airplane is not the noisest I've ever flown, it's pretty close—simply because it's impossible to make an airplane as transparent as this one as quiet as your Aunt Maude would like to have it. But remember: this is a mili- (*Continued on page* 62)



Controls and cabin layout of Observer 90 are similar to other Luscombes except for throttle which is on left-hand side of plane's cockpit.



Unusual fin of Luscombe attaches to conventional vertical stabilizer and provides added stability. Like other Luscombes, plane is all metal.

Plexiglas bubble in rear permits passenger (or observer) to see in all directions except directly beneath. His head sticks up into the bubble and he can even see over the top of the wing. Plane has 90-h.p. engine, cruises at 112 m.p.h., has range of 550 miles.

The Zaunkoenig is tested in England with wool tufts on wing to check the airflow. Full-span slots and flaps help craft to fly slow.

The Nazi's Foolproof Plane

You can fly the Zaunkoenig safely if you've never been up before.

LEARN to fly without dual instruction? Impossible! But the Germans did just that. They built an airplane during the war that could be flown by a beginner without dual instruction, after only half an hour's ground schooling.

The plane, a high-wing parasol monoplane powered by a 51 h.p. Zuendapp Z9-92 engine, has little performance-wise to distinguish it. Dubbed the *Zaunkoenig* (Wren), it cruises at only 54 m.p.h. and accommodates only one person. It nonetheless is nearly foolproof. Should its design be adapted in the U. S., it might enable anybody to get into the air with only a few minutes' instruction.

Only one model of the *Zaunkoenig* exists. It is being studied at England's Royal Aircraft Establishment aerodynamic test section at Farnsborough, where a British aviation journalist, R. G. Worcester recently gave it a check hop. Writing in the authoritative British magazine, *The Aeroplane*, Worcester concluded:

". . . the actual description of what goes on [can be] compressed into something like this. 'To take off, open the throttle and the aircraft cannot fail to fly itself away.' And again, 'to land you put the stick comfortably with 40 m.p.h. on the clock and wait until the ground hits the aircraft.'" It's that simple.

What's more, the *Zaunkoenig* can't be stalled, flaps up or flaps down. Tests show that at 38 m.p.h. the center section of the wing is stalled but the outer part of the span is unstalled—and lateral control is retained. It is estimated that with a specially strengthened undercarriage fitted to the *Zaunkoenig*, a semi-stalled attitude could be maintained until it hit the ground in a "parachute-landing."

The plane is said to be able to land in 85½ feet with full-flaps and brakes on. That's only about four times its own length. For the average pilot, a landing area of 66x264 feet is estimated as sufficient, though in initial flights most pilots require a runway about 424 feet long.

The *Zaunkoenig* flies itself off with flaps at 31 m.p.h. in a four mile wind, but can be pulled off at 30 m.p.h. Without flaps, the plane flies away at 44 m.p.h. after a 330-foot

THE ZAUNKOENIG'S RECORD

1. Novice flyers can solo with only half hour's ground schooling.
2. Take-off in 165 feet at 35 m.p.h. airspeed.
3. Slow-flight at 38 m.p.h., and impossible to stall at that speed.
4. Claimed shortest landing run, with brakes on and full flaps: 85½ feet, about four times plane's length.

run (though it can be pulled off at 42 m.p.h.).

Writing in *The Aeroplane*, Check Pilot Worcester commented:

"There is an overwhelming impression of the wing as a lifting surface, with life and limb suspended from it by a series of jolly little struts . . .

"Obviously, pilots unsure of themselves in conventional lightplanes [however] would be able to fly the *Zaunkoenig* without difficulty. This reveals a new use for an aircraft as a 'morale-builder' or 'confidence restorer.'

". . . It is quite a gymnastic experience to climb into the cockpit, owing to its position close under the wing. The operation entails maneuvering the feet in first, with one's body lying along the center section, and slowly edging oneself in. By throwing out the parachute and cushion, and sitting on the floor, I found my head and shoulders were rightly positioned . . .

"Fuel and oil pressure gauges are combined in a single instrument . . . There are no trimmers and there is no need to check the ignition because the motor has only one magneto. Flaps can be placed anywhere you like and then, as already stated, to leave the ground you open the throttle . . .

"With flaps fully down the aircraft seems to fly off with all three points leaving the ground together—if anything, the main wheels leave the ground first and fairly strong forward pressure is needed on the stick to maintain a comfortable climb of 47 m.p.h. at 1,700 r.p.m. . . . As there is no elevator trimmer, the aircraft will not normally fly hands-off and a slight pull-force is needed on the stick . . .

"When preparing to land, the maximum speed for operating the flaps is 75 m.p.h. Winding down the flaps produces a fairly strong nose-up change of trim, requiring a brisk and sustained push-force on the stick. An approach of 45 m.p.h., flaps up, or 40 m.p.h., flaps down, should normally be made, touching down at 35-39 m.p.h. The landing can be made without flattening out, since the aircraft approaches in the three-point attitude like a *Lysander*."

The *Zaunkoenig* originally was designed for a 16° variable-incidence wing. The plane at the Farnsborough laboratories does not have this equipment fitted, however. The model in English hands has a wing with 7.52 aspect ratio. The wing is rectangular, untwisted and has no sweep. It has 2° dihedral and full-span fixed slots, semi-span slotted trailing edge flaps with drooping slotted ailerons. The leading-edge slot is all-metal, but the remaining wing structure is wooden.

Fuselage is wooden monocoque, and contains a six-gallon fuel tank immediately behind the fireproof bulkhead. Flaps have a maximum depression angle of 40°.

Photographs on these pages show a number of wool tufts on the top surface of the wing (area 91.5 square feet). By photographing these tufts, which were placed on the wing for experimental purposes, a helicopter cameraman was able to show that it is impossible to stall the aircraft, flaps up or down, engine off or on—and at the lowest speed, flaps up, of 38 m.p.h., the wool tufts showed the center section stalled but the outer portion of the span unstalled.

In some ways, the *Zaunkoenig* is an aerodynamic adventure. For example, its tailplane can be designed for a variable-incidence gear which can move with the variable-incidence wing. To accommodate this coupling, the tailplane was arranged on top of the fin, swiveling about on the axis formed by the four attachments of supporting struts.

The original version of the plane was built at Germany's Technical University of Brunswick according to the designs of Dr. Ing. H. Winter, noted designer of the Berlin Charlotte sailplane. It first flew in 1945. END

ZAUNKOENIG
(Wren)

One 51 h.p. Zuendapp Z9-92 engine

Wing Span	26.4 ft.
Length	19.9 ft.
Height	7.85 ft.
Max. Gross Weight	776 lbs.
Empty Weight	553 lbs.
Top Speed	87.3 m.p.h.
Cruising Speed	53 m.p.h.
Rate of Climb (sea level)	562 f.p.m.
Service Ceiling	12,500 ft.

Information from THE AEROPLANE

Landing the Zaunkoenig, the pilot simply adjusts the stick to give 40 m.p.h. and waits until "the ground hits the aircraft."

Minnesota State Fair (August 28-September 6) will have horse and auto races, a gigantic Air Force exposition.

A FLYING Holiday

Midwest State Fairs

For a novel holiday, make a grand tour of the fairs in Minnesota, Wisconsin, Indiana, Iowa.

MIDWESTERN pilots will have little trouble getting to the four large state fairs in Indiana, Minnesota, Iowa and Wisconsin during the next few weeks. They can fly to airports near any of the expositions—and die-hards can make a grand tour of all four fairs.

Flyers will find that the traditional color of State Fairs has not been lost in this age of atom bombs and better mouse traps. The canvas tents still stretch over long rows of cattle stalls, and the blue ribbons still flutter alongside sleek, well-fed hogs. The fair grounds will be filled with all the trappings of the American State Fair—everything, including little girls gummed up with cotton candy and proud farm wives discussing the merits of Aunt Nellie's prize preserves.

But also at these fairs are a number of new attractions which give evidence to the rapid pace of modern American life. There are exhibits on transportation and industry which have cost hundreds of thousands of dollars. There are air-age shows which cover the development of aviation over the past few years.

And in line with all this, the fair committees and boards have made plans for an unusually large pilot-attendance at the expositions.

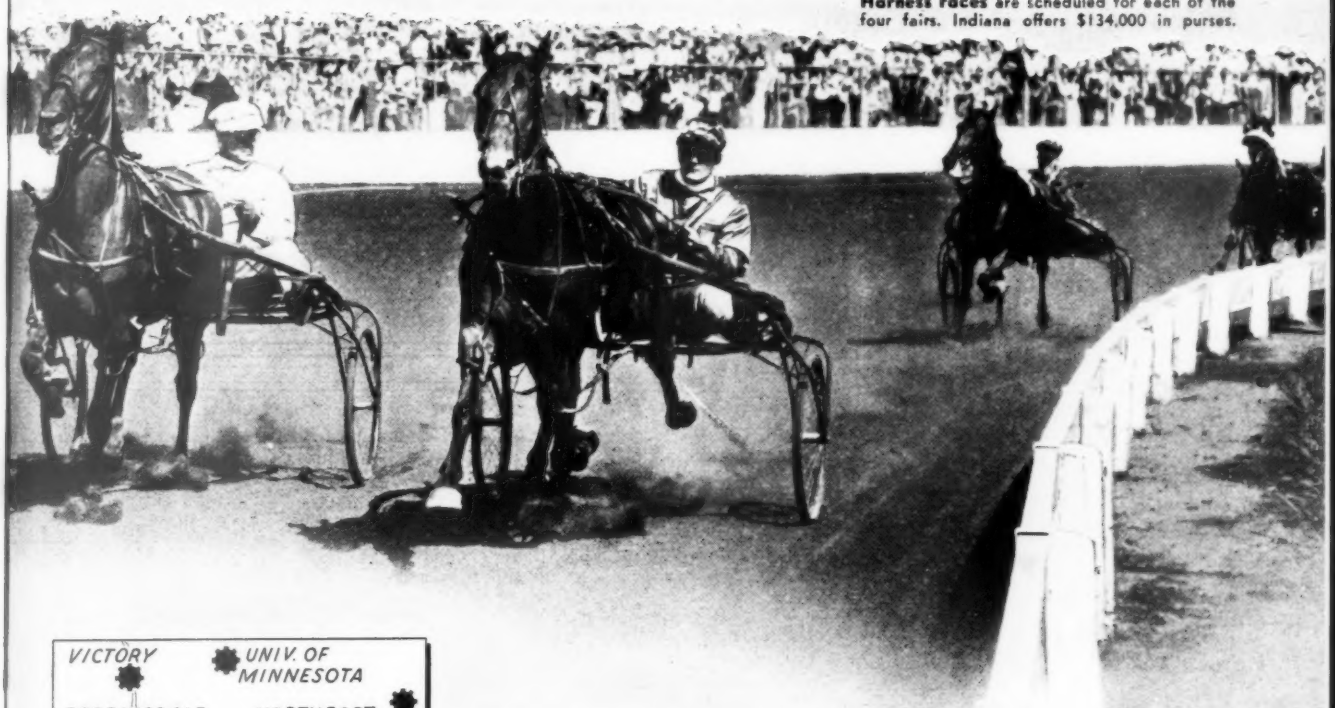
Wisconsin Centennial Exposition

Wisconsin's Centennial Exposition at Milwaukee is currently in progress (through August 29), and the other three fairs begin within the (*Continued on page* 58)

World's finest blue-ribbon livestock are shown at Iowa Fair. Between 6,000 and 7,000 head from 20 states vie for prizes.

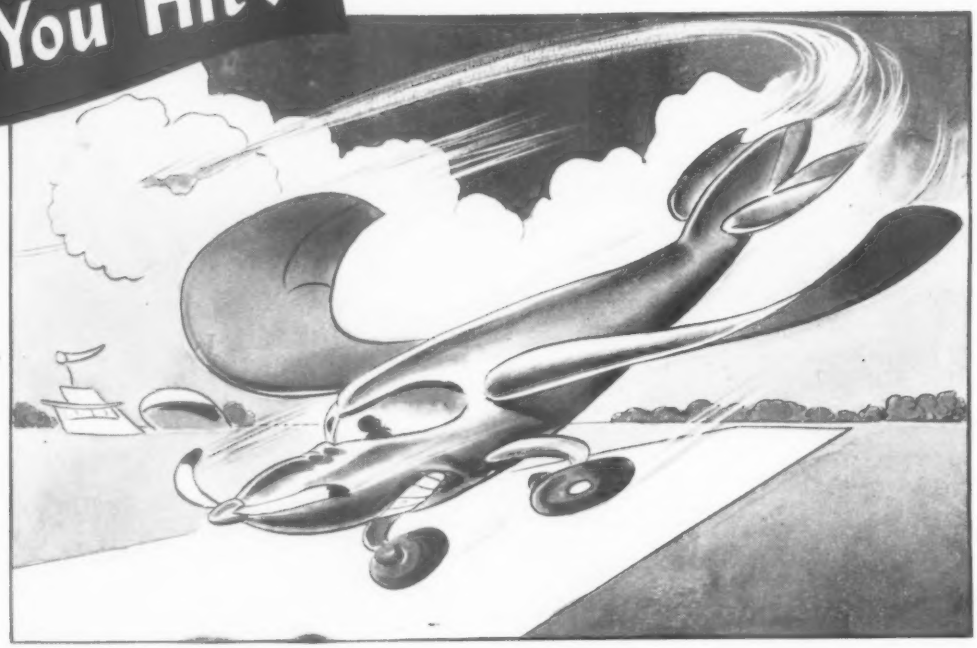
Indiana Fair board member Earl Bailey and son, Don, flew plane to meetings. Fair president Louis Demberger, left.

Harness races are scheduled for each of the four fairs. Indiana offers $134,000 in purses.



How Hard Do You Hit?

When you hit at the rate of 100 feet per minute, your landing will surprise you.



By HY SHERIDAN

"SUPPOSE," asked a young pilot at the lunch counter, "suppose at the last minute I can't see the ground, see, because there is a wet, glassy runway or some oil splashes on my windshield or something like that, and I don't level out and I hit. What happens?"

The other birdmen at the lunch counter were all young —that is, they were trying to learn instead of forget. Not like old airline pilots. "How fast are you going down?" one of them asked.

"Well," replied the first, "I know I'm close to the ground so I've leveled out part way, see. And I hit."

"How fast, though. You got to tell us that. You hit according to how fast you're going down."

"Say 100 feet a minute. That ought to be about right. What happens?"

"A hundred feet a minute? Why, your airplane would be so flat a grasshopper would have to look down to see into the cockpit!"

There was a chorus of disagreement that even the United Nations would have been proud of. One of the lads said that the airplane would only take a very bad bounce. Another said that it would turn over. Still another thought that it depended a lot on the forward speed, that an airliner would crack up for sure but a *Cub* wouldn't.

The lad at the end of the counter was a mathematician, although normal in other respects. He stated, "You would make about the best landing of your career."

It was a good, hot argument.

Now that the military and the airlines and some private pilots are making ILS and GCA approaches that are blind up to the last moment and may even be blind at the touch-down, it is a very important thing to know. A pilot can't keep one eye on the instruments and the other out the windshield unless he is more cockeyed than most of us like to admit. If he gives up his instruments for an instant it takes another moment to get back on them, so delicate are the adjustments and readings near the ground. Any pilot may get caught and have to make it blind throughout. Even many private pilots have to land on a dark field without benefit of landing lights.

The answer is important. Now who is right? It is the lad at the end of the lunch counter.

An airplane descending at a hundred feet a minute will make the same impact as it would in a free drop of a half inch—.521 inch to be exact.

Most landings by sight touch down harder than that unless you really paint her on to the runway. If you had an airplane in the hangar and raised it a half inch by a suitable rope and then dropped it, it would hit with the same force as it would landing at 100 feet a minute on the climb indicator.

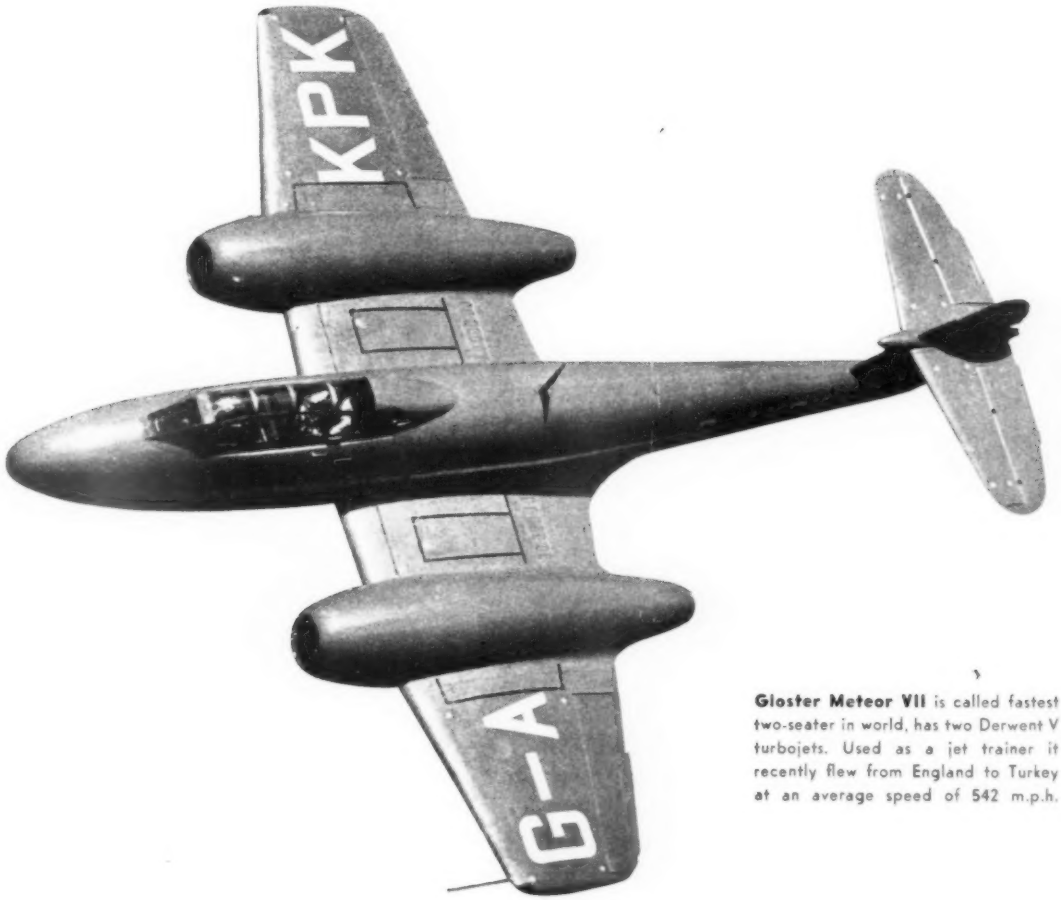
What is surprising to most of us is that the force of the impact is not affected in the slightest by the amount of lift that happens to be on the wings nor the forward speed of the airplane.

Now, the reason the impact of any object descending at the rate of 100 feet a minute is the same as though it were dropped a half inch is simple. When an object is dropped it takes a half inch for (*Continued on page* 75)

Swivel-geared Bellanca is another in the series of CAA's cross-wind experiments. Wheels don't retract.

Three-engined Aeronca C-3, owned by Howard Libersky, Mason City, Ia., has a 65-h.p. engine plus two 20-h.p. outriggers, takes off in 25 feet in 20-m.p.h. wind.

HAVE YOU SEEN?



Gloster Meteor VII is called fastest two-seater in world, has two Derwent V turbojets. Used as a jet trainer it recently flew from England to Turkey at an average speed of 542 m.p.h.

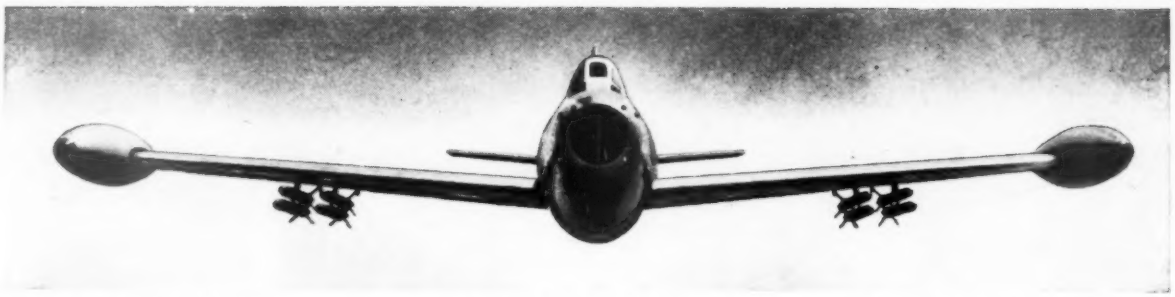
Fairey Junior, new British single-seater, weighs 430 pounds, cruises 66 m.p.h. at less than two gallons per hour. Price: about $2,000.

Douglas C-124 will be Air Force's largest production transport. It will have a 50,000-pound payload at 1,200-mile radius and will carry 222 equipped troops. Orders total 28.

Flying television station is B-29 modified by Martin and Westinghouse to extend line-of-sight ranges of television stations. Ground programs are picked up and rebroadcast.

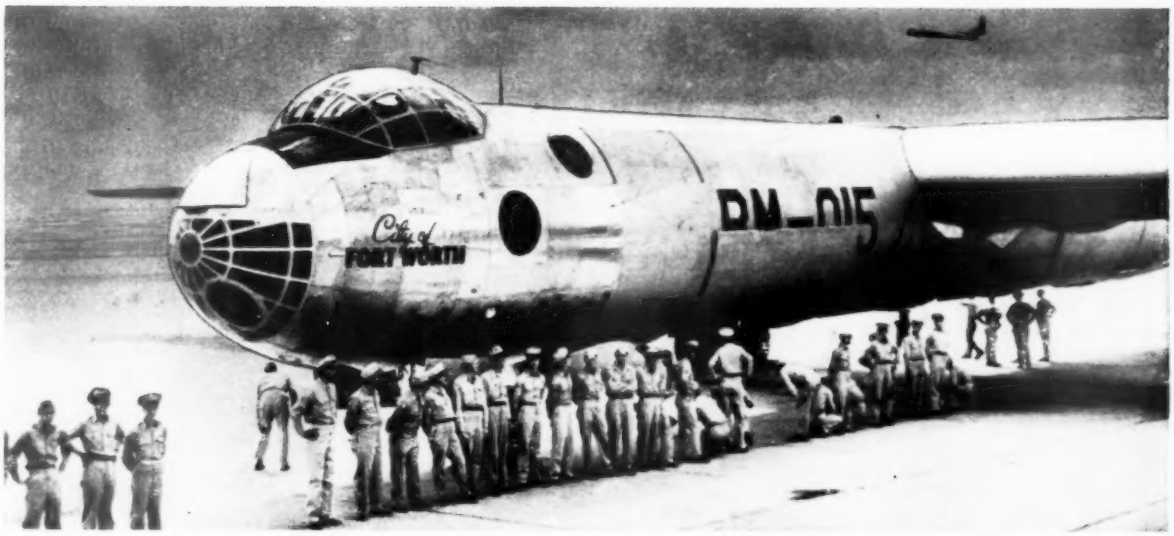
New view of Silvaire Sedan showing unusual top windows which add to visibility. Note fin attached to vertical stabilizer.

DeHavilland Drover is eight-place transport built in Australia. It cruises 135 m.p.h. with three 145-h.p. Gypsy Majors.



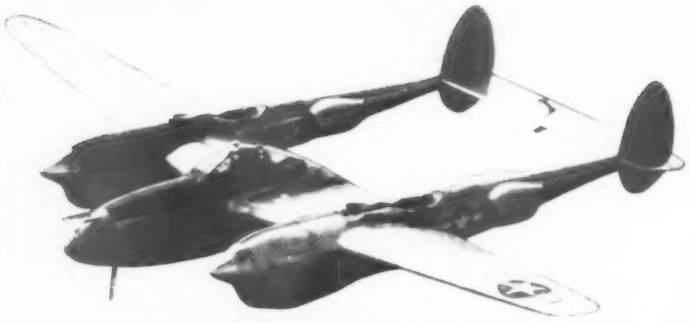
Republic Thunderjets (F-84) can now be equipped with eight high velocity rockets. About 1,000 of these fast fighters are on order.

Production Martin Mercator (P4M-1) has two 3,250-h.p. P.&W. engines in front, two Allison 4,000-pound thrust jets in rear of nacelles.



First combat model of B-36 has been delivered to the Air Force at Fort Worth, Tex. Plane has 15-man operating and fighting crew.

A sunny North African day, a new P-38, fun in the clouds— and carelessness spoiled it all.



Author's P-38 looked "okay". But it wasn't.

I Learned About Flying From That! NO. 106

By

Lieut. RICHARD H. BETCHLEY

THE SPANKING new P-38s gleamed in the North African sun that day in early 1943. A few hours before, they had been nothing but stripped fuselages and crated parts. Now, re-assembled, they were beauties—and we were busy putting them together and testing them.

I selected a plane and went over the tires and control surfaces to see they were okay. I checked the *Lightning's* forms, noting they were properly "signed-out" with a flight release. The papers seemed in order, with one tiny flaw. Though the crew chief had initialed them, the technical inspector hadn't. That wasn't too important, though —I knew he was busy and took it for granted he had just forgotten to sign the form.

Climbing into the cockpit, I stuck the forms in their holder, locked the brakes and started the engines. Habitually, I gave the routine ground check. But I wasn't worried about what was under the cowling. That wasn't my department. "It's simple," I reasoned, "If the controls are okay—and if the engines ground-check okay, then *everything's* okay." I ran up each engine, took a quick look at the generator and radio and taxied out to take-off position.

With the *Lightning* straining at the bit, whining for a crack at North African skies, I gave the engines a full power test, checked the turbo-superchargers to see if they cut in properly, and ascertained that the throttles were even. Satisfied everything was okay, I cleared myself with the tower and gave the plane its head.

The day was clear, with cumulus clouds between 10,000 and 15,000 feet. As soon as the wheels retracted I cut the throttles back and climbed slowly to save the engines. I didn't have much to do that day, and started playing around among the cumulus, doing barrel-rolls and enjoying the clouds which billowed beneath me. The *Lightning* was a queen—the war seemed far away—and I was having a marvelous time. I noticed, during one of my frequent instrument checks, that the oil pressure of the right engine was falling below normal. Not wanting to ruin the new engine, I feathered it immediately, closed coolant and oil shutters and cut the ignition switch for that engine. It wasn't anything to worry about and I followed the "Standard Operating Procedure" to the letter.

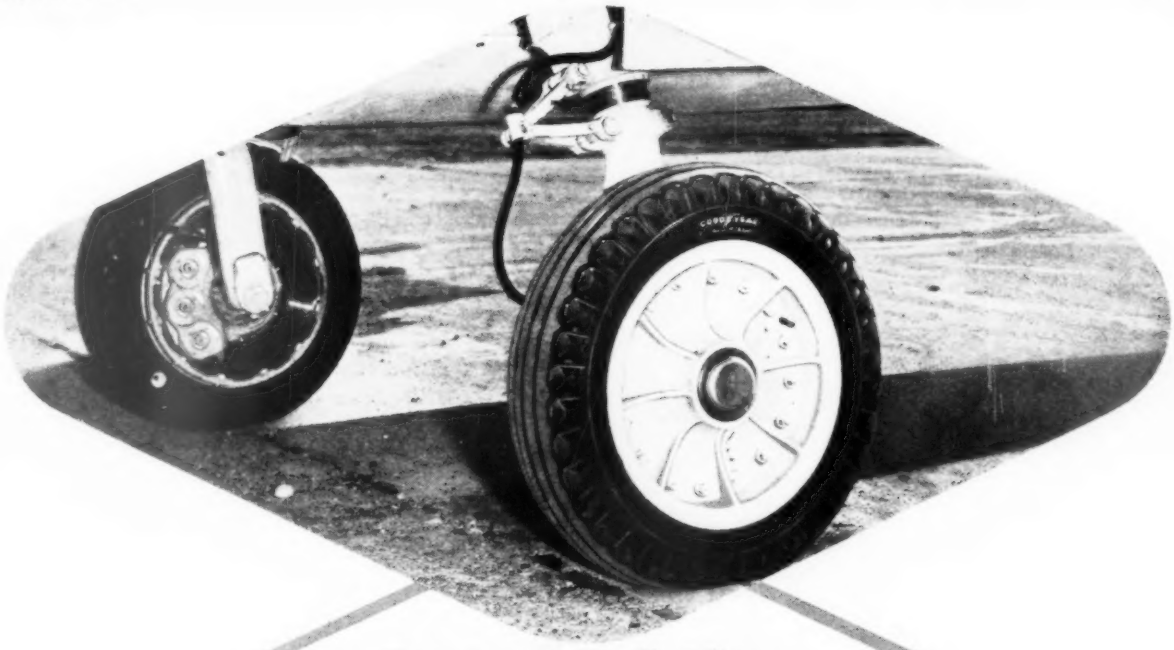
A P-38 with one engine operating is easy to handle. I knew from previous experience it could climb and fly well with that one engine clicking along. And since the generator was in the left engine nacelle I wasn't worried about electrical power failure.

"Why go in, land and check the oil pressure failure?" I asked myself. "Not on a day like this. Not with this P-38, and its one purring engine."

Instead, I decided to brush up on single-engine barrel rolls. So the clouds and the *Lightning* and I continued our practice session. I felt pretty good. Nothing to do except play in the clouds. And those one-engine barrel rolls were coming along beautifully, polished to the point they couldn't be improved. I didn't have a worry in the world.

Suddenly, during one of those rolls, a hydraulic line running along the right side of the cockpit floor burst. The entire cockpit was filled with fine spray. It covered the windshield, turning the Plexiglas into a distorted translucence. The spray filled my eyes.

I lowered my goggles, and swabbed frantically at the windshield. But fast as I cleared it, the drafts in the cockpit covered the Plexiglas (*Continued on page* 74)



Super-Tough Tires

meet Skyrocket needs

The Skyrocket — Navy-Douglas high-speed research plane — presents tremendous landing-wheel problems. Tires, wheels and brakes must be lightweight, yet super-tough to take terrific take-off and landing speeds. That's why Goodyear extra-high-pressure tires, Goodyear magnesium alloy wheels and Goodyear Single Disc Brakes are used — they combine extra ruggedness, longer life and greater wear. Because Goodyear makes the right kind of landing-gear equipment for every type of ship, Goodyear Aviation Products are first choice with aircraft manufacturers and airline operators alike. For complete information about Goodyear Aviation Products, write: Goodyear, Aviation Products Division, Akron 16, Ohio, or Los Angeles 54, California.

GOODYEAR
AVIATION
PRODUCTS

NATIONAL AIR RACES 1948 CLEVELAND SEPT 4 5 6

MORE AIRCRAFT LAND ON GOODYEAR TIRES THAN ON ANY OTHER KIND

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

GASOLINE MONOPOLIES

GASOLINE monopolies at airports are coming up for investigation, due largely to repeated protests by AOPA. An investigating committee has been appointed by the Non-Scheduled Advisory Committee of the CAA, with action and recommendations expected shortly. The committee is made up of Dr. Lynn Bollinger of Harvard, co-author of "*Personal Aircraft Business at Airports*," Leighton Collins, editor of Air Facts magazine, and J. B. Hartranft, Jr., AOPA general manager.

LONG-DISTANCE FLIGHT

Details of an attempted coast-to-coast non-stop flight by a Luscombe *Silvaire* are revealed in the current issue of AOPA's monthly confidential newsletter, which goes only to active members. Pilot Chester Keasling of Los Angeles took off with 140.35 gallons of fuel, enough for more than 29 hours of flight at the engine's normal rate of consumption. But the engine began overheating just outside of El Paso, Tex. Keasling made a miraculous forced landing on a highway 25 miles east of El Paso, in the dark. He got the plane down undamaged despite the fact that it weighed 1,800 pounds (400 pounds over normal) at the time of landing.

CROSSWIND GEAR

Full details on the status of Goodyear's crosswind landing gear appear in the next issue of The AOPA PILOT. The article reveals that Goodyear started actual production deliveries of the wheels July 1. CAA Type Certificates have been issued for the gear on the following planes:

Piper J-3 and PA-11, Goodyear *Duck* (not on market), Stinson *Voyager* (but gear not available from Stinson factory), Cessna 120, 140 and 170.

Meanwhile, The PILOT article says, type certificate tests are under way for the installation of crosswind gear on the following types:

Aeronca *Sedan*, *Champion* and *Chief*, Luscombe Models 11, 8A and 8AE; Taylorcraft B-12 and Beech *Bonanza*.

Further details in the current issue of The PILOT.

HIS MAJESTY, 554

New member of AOPA is His Majesty King Michael of Romania, an enthusiastic pilot. On a recent visit to the U. S. he flew a Beech *Bonanza* for a short time. His AOPA membership was entered by Dr. J. C. Button, Jr., AOPA 26181, of Newark, N. J. The royal membership number: 554. Detailed article in this issue of The PILOT, which goes only to AOPA members.

SEAPLANE PILOTS

Since Seaplane Flyers Association became affiliated with AOPA, national headquarters have asked all AOPA members with seaplane ratings to notify AOPA of that fact. To date 160 AOPA members have registered their seaplane ratings.

FLY IN THE NAVY

AOPA members who meet Navy qualifications can get into Naval aviation immediately with the rank of ensign. Navy air officials advise AOPA they need flyers and have set up special arrangements to handle prospects. Applicants must be either native-born or have been naturalized at least 10 years, must be 19 but not over 25, and must have completed the equivalent of a four-year college course. Physical requirements still are high. As soon as commissioned, new Naval aviation ensigns get pay and allowances totalling $290 a month. Training—including 15 months of flight training—takes 18 months.

Interested AOPA members can get further details from national headquarters.

BORDER RUMPUS

Donald T. MacRobbie, co-partner in the aviation firm of Murray-MacRobbie Co., Del Mar, Calif., was flying one of his company's planes, an AT-6, back from Mexico in January. He took off from Tiajuana airport, Baja California, and crossed the border, heading for Lindbergh Field, San Diego. He had made the proper arrangements for that part of the flight.

But the weather closed in at San Diego, so MacRobbie turned east toward the desert, planning to land at Calexico, Calif., where customs and immigration facilities are available. By the time he arrived over Calexico MacRobbie could not find the airport because of blowing sand and sunset. Running low on fuel, he flew back into Mexico, landing at the Mexicali airport. There he was directed to the Calexico field, and he flew back across the border and landed at the U. S. field. Two Treasury Department border patrolmen immediately took him into custody for having crossed the border illegally.

When MacRobbie received notification that he was to be fined $1,000 for violations of the customs and immigration laws, his partner—William E. Murray, AOPA 12892—appealed to AOPA for help. Lloyd R. Wilson, Jr., AOPA assistant general manager, took up the case with Government authorities in Washington. After more than two months of negotiations, during which it was clearly established that there were extenuating circumstances which caused MacRobbie to land at a field other than that originally designated, the Customs and Immigration officials reduced the fine to $50.

FLORIDA AIR TOUR

Pilots participating in Florida's 1948 State Air Tour flew over 20,000 miles in four days with a perfect safety record. The tour, which originated in Miami, was the longest conducted by any state during National Air Tour Week. The flight visited Vero Beach, Daytona Beach, St. Augustine, Jacksonville, Perry, Cedar Key, Clearwater and Lake Wales. Total mileage was 690 air miles. No mechanical difficulties or accidents occurred in any part of the trip.

Experimental landing gear on Bellanca has small double wheels, a crosswind mechanism that swivels in the strut. Unlike conventional Bellanca gear, this one does not retract.

"I LIKE MY customers to have the same kind of good service my plane gets from Esso. In serving 12,000,000 meals a year, time is an important factor... and the dependability of Esso Aviation Fuels and Lubricants helps me save time visiting the eight cafeterias of mine that stretch from Washington, D. C. to Atlanta, Georgia."

Frank O. Sherrill (left above)
President, S & W Cafeterias

Interior of the S & W Cafeteria's private DC-3.

"IN THE AIR CORPS I learned the value of Esso Aviation Products, so when I organized American Air Services it was only natural that I chose to identify my business with the popular Esso Wings."

Ed Winslow (right above)
President, American Air Service, Inc.
Douglas Airport, Charlotte, N. C.

NO. 31 IN THE SERIES FEATURING PROMINENT ESSO AIRPORT DEALERS

Lightplane Revolution

(*Continued from page 34*)

new ones in sight applicable to present types.

STRUCTURE. About as compact in strength-weight ratio as can be had.

TIRES. Excellent already. Small improvement in sight. More wheels in the offing with the coming of the roadable.

BRAKES. These can only be lighter if they have less work to do. And so on for the rest!

There is not even a basis in present assumptions of plane design which could create the kind of personal plane we need!

Combining all our present known approaches to small plane design—cost no object—we still cannot gain more than a small percentage in utility or demand.

The solution is not in this deck of cards.

The new and necessary "Universal Vehicle" cannot be developed out of any of our present types of air or land vehicles.

Then what are the basic problems of this thing we are first trying to visualize and will try to make?

One basic fault of all present planes is that they can use a lot of horsepower for take-off and flight and yet *cannot use one mouse-power to let themselves down.* This is bad item No. 1.

We must have a vehicle that can use all of its power for landing and can, therefore, set down anywhere at will in its own length.

It must also be able to take off from the same spot. If it could hover in flight that would be an advantage but it is not a necessity.

It must be capable of vertical take-off within 10 feet and then be capable of forward flight at a 45° angle for at least 100 feet of climb.

While it must have the vertical take-off of a helicopter, yet, after it is up, its machinery of take-off must not in any way handicap its forward speed. In fact with the same power plant this new vehicle should have much more forward speed than present small personal planes.

Our proposed plane should be able to approach a landing from 200 feet altitude and, on arrival, let itself down at 45° to a dead stop after it lands.

Once down, it must be able to move about on the streets in traffic under perfect motor-car type control with a maximum speed of at least 40 m.p.h.

Travelling over the highways the whole ship must go along—nothing left behind at the airport to go back for before you take off from some place else. In fact, an airport should not be necessary to use this vehicle.

The length of the vehicle should not be greater than that of a big car since it must be parked at the curb like a car if it is to be completely useful.

All of this means small wing area, folding wings or equivalent; shorter tail, if any, and many more things that cannot be done by "floating type" wings—those getting lift only from forward motion.

This will mean the ability *to double the lift of the wing area for take-off and landing.* The necessary extra lift cannot be had by slots or flaps for our new machine must weigh less, not more, than the simplest present plane. On the ground folded the height should not be over seven feet, and the width not over eight feet.

And by now we have dug ourselves so deeply into a hole hemmed in by impossibilities that it will take a lot of imagineering to get us out.

But remember that the first reason for all this is the need to produce a vehicle that will create a mass demand of 1,000 a day at least.

Before we get universal demand we must start from scratch on a brand new approach just as the Wright Brothers did. We have, however, the tremendous advantage of modern research instrumentation, and research knowledge of air and power and structural materials that the Wrights did not have to draw on.

And so we come to the start!

It would not make sense to start on something that had no past history and no precedent. First we must solve this "direct lift" problem.

Consider the helicopter, the second oldest idea for flight that was ever proposed, yet it took 500 years before Sikorsky learned how to make one fly.

An old idea, yes, but solved by new engineering and a new approach to the problem, made possible by a lot of engineering research that the first man who tried it didn't have.

Five of our newest developments for aircraft were on the original B-Wright biplane—ideas which the experimenter of that day thought no good because he didn't know enough himself to know if they were any good. They were neglected for years: catapult take-off, counter-rotating propellers, fuel injection, multiple-wheel landing gear, arrester landings, canard front tail location etc., all old.

But with new engineering we do new things with them that the Wrights never dreamed of.

So too, with the helicopter, it is a great success for going up and down, for hovering over a spot, for rescue work, and *for everything except going forward.* The rotating wing uses up most of its speed to get off the ground. The blades travel at 250 m.p.h. when the plane is standing still, so there is little economical speed left for going anywhere.

When you go at 50 m.p.h. forward in calm air, you pay the gas and horsepower cost of going at 300 m.p.h. for a speed that is too low for practical travel even in a 20 m.p.h. tailwind. But the helicopter is certainly the germ of an idea.

It is bad to move a propeller forward edgewise against the air. The blade moving toward the air gets more lift than the blade going away. In a helicopter at 100 m.p.h., with the blades turning at 200 m.p.h., the blade moving against the air as it goes forward has a 400 m.p.h. lift on the blade. That same blade a quarter of a second later going backwards on the other side will have only a 200 m.p.h. lift. So we hinge the blades, or change their angle, or both, and all the helicopter controversy is as to who can invent the best way to make up for the basic fault of the craft—the wing on one side lifts four times as much as that on the other.

The blade on the fast side goes up under the extra load. On the other side, with 200 m.p.h. less lifting wind, it springs down, so we have blades "flapping" up and down like a bird's wing, with an amplitude measured in feet. Just try and stabilize a varying load like that.

There is no other precedent in man's hunt for vertical lift except the oldest and the one in worst repute.

"The bird can fly so why can't I?" asked Darius Green—and maybe he was close to an idea at that.

The bird is not the precedent of Nature that we want to look at first, however. Even if we knew all about birds and how they do what they do, we are not far enough along yet as engineers to make such a thing as a bird's wing with a brain in every feather.

There *is* a precedent that goes back 50,000,000 years, however. Let's look at

15 YEARS AGO

FROM the September, 1933, issue of this magazine:

A single seater Corsair, Model V-80, was produced by Chance Vought. A direct development of the two-seater *Corsair*, the V-80 was powered with a 700-h.p. *Hornet* engine, carried four machine guns, two bomb racks, had a fuel capacity of 173 gallons, and a top speed of 190 m.p.h.

Wiley Post (right) in *Winnie Mae* broke his former round-the-world record. Time for the 15,000 mile trip was 7 days, 18 hours. He had an auto pilot to relieve the strain of flying the ship.

The "Red Bullet," winner of the world's seaplane record in Italy with a speed of 423 m.p.h. had a peculiar engine arrangement. Two Fiat engines arranged in tandem fashion occupied most of the space forward of the cockpit and turned two propellers in opposite directions. Saddle bag radiators were placed over top of pontoons.

U. S. Army Air Corps ordered 46 of the new Curtiss A-12 attack planes which carried five machine guns and a large bomb beneath the fuselage. Powered by one nine-cylinder 700-h.p. Wright *Cyclone* engine, the A-12 was an all-metal two-seater equipped with Handley-Page lift slots and flaps.

TWENTY YEARS AGO

Winner of the 1928 National Air Tour, which started from Ford Airport in Detroit, was John P. Wood, piloting a Waco with a Wright J-5 engine. Frank Hawks, piloting a trimotored Ford, was second, and Randolph Page with a Stinson *Detroiter, Jr.*, was third.

BEAT Rising Prices... Buy at AIR ASSOCIATES

$39.50

Complete with Battery Pack and Interconnecting Cable.

AIRADIO Sets

Here's a rare opportunity for owners and operators of light planes to equip their ships with powerful, light-weight communication equipment at minimum cost.

AIRADIO'S SUPER "41" DRY BATTERY-OPERATED RECEIVER

Unequalled for clarity of long range reception. Quickly installed — simple to operate. Standard size components — replaceable anywhere, any time. Manual or automatic volume control. Five-tube superheterodyne with tuned RF stage. Built-in Range Filter instantly available. Total Weight (Receiver and Battery) only 8-lbs. 6-ozs. $39.50

AIRADIO'S SUPER "52" TWO-WAY RADIO

Storage Battery-operated. Built-in Range Filter. Tuned RF stage. Manual or automatic volume control. Interphone communication. Receiver includes standard broadcast band of 550-1500 kc., plus regular radio band of 195-420 kc. Weight, complete, 10-lbs. 10-ozs.

An A-A Super Value — $125.

Instant Wind Readings

with Hastings Anemometer

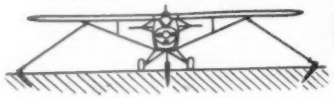
This latest type, extremely sensitive anemometer gives quick, accurate, direct readings of wind direction and velocity

OUTSIDE UNIT—streamlined, highly efficient transmitter which registers BOTH wind direction and velocity. 20" long, 15" high. Weight: 2½ pounds. All parts corrosion and rust-resistant.

INSIDE UNIT—two matched dials in handsome plastic case. Can be located anywhere indoors.

CONNECTION between units made with single 4-conductor cable.

Standard anemometer operates on 110-volt A.C. Dry battery unit furnished on special order. Complete, with 30 ft. of cable — $150.



MOORING KIT

Weighs only 4 pounds, but is able to secure any light airplane. Indispensable for tying a ship down on a strange field, or after a forced landing.

STAKES: Cast aluminum, 15" long, with star drill point. Can be driven into frozen ground.

ROPES: 5/16" diameter #1 Manila. Tensile strength 1,000-lbs. Served at ends.

COMPLETE SET: 3 stakes and 3 ropes in strong, folding, leatherette or canvas kit bag. Extremely compact. $9.95

End Motion Sickness with TRIP-EZE Medicated Chewing Gum

Trip-Eze medicated chewing gum has been specially formulated to combat motion sickness. Ideal for student flyers and air passengers. Attractively boxed in packages of five and twelve tablets each — Full instructions on each box.

Box of 5 **50c**

Box of 12 **$1**

Attention Airport Managers and Fixed Base Operators —here's a demand item it will profit you to stock. Tried — proven — accepted — wanted. A fast selling item with plenty of repeat business.

LIBERAL DISCOUNTS TO AIRCRAFT SERVICE OPERATOR TRADE

MEMBER AMA

AIR ASSOCIATES

INCORPORATED

TETERBORO, NEW JERSEY • Hasbrouck Heights 8-1500

LOS ANGELES
5827 W. Century Blvd., Los Angeles 45, Cal.
Oregon 8-2201

DALLAS
3200 Love Field Drive, Dallas 9, Texas
Dixon 4-2611

CHICAGO
5300 West 63rd St., Chicago 38, Ill.
Portsmouth 7373

LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

COMICAL-DIRECTION RANGES

PRIVATE pilots need not be too despondent over the new omni-direction ranges that were put over so deftly. As Sadie the Stewardess discovered to her dismay, the hand is quicker than the eye, especially in the dark. One day there was little known about the comical-direction ranges and the next day we had 'em. As soon as some more of them are put in, the CAA is going to turn off the regular beam stations.

Private pilots will have to use 'em if they want to use the airways. All they have to do is buy a little instrument that so far costs $1,900 or so plus installation, taxes, maintenance and what all.

That's one thing I like about democracy—they don't bother you about anything except to tell you how much it has cost you. This is the land of the free if you have a Government job.

But don't despond. You can stick to your little loop (if they let you) and your broadcasting stations. The comical-direction ranges won't be able to compete unless they put some entertainment on the voice channels.

* * *

Were you surprised to see Gipsy Rose Lee on the FLYING's July cover? She must be a pretty good pilot by this time; she's had so much experience in taking off.

* * *

Even though I am developing quite a following as a result of this column I think I will be able to outdistance them.

* * *

BREAKING THE BANK. There is a rumor going about that one of the airlines is giving applicants for pilot jobs a cunning psychological examination. One part of the examination is designed to determine, by means of disguised questions and tests, what the social psychologists call the dominance-submission trait.

In our language it would be called rugged individualism as against dependence. It is said that they are hiring men on their showing in this trait-couple—the submissive characters being the ones anointed.

The idea is that such men will do what they are told to do, their slogan being, "Why should I stick my neck out?" This program will hurt the Air Line Pilots Association.

Business leaders are gamblers. Now I begin to understand the situation. They want to break the Behncke.

What the managers fail to note is that submissiveness by a pilot can be a costly trait when his airliner is in trouble. Psychologists have been able to demonstrate that the submission trait is usually associated with fear and with an inability to think in the presence of an emergency. Submissive men have a sort of built-in pilot error.

* * *

NOTES ON A PILOT'S VISION

The bird in the tower says, "Ceilings are low;
"Your turn to approach is three seven."
I seem to have weather wherever I go.
(The stew'rdess' eyes are like heaven.)

The bird in the tower says, "Land with due care,
"The air is quite rough near the ground."
Now, how does he think that I land—debonaire?
(The legs of the lass are so round.)

The bird in the tower says, "Ice is reported
"In the mist at the lower levels."
Oh, a wing full of ice I have often sported.
(Her lips seem to promise of revels.)

The bird in the tower says, "Now it's your time,
"But the fog is considerably worse."
How little to me is a sputter of rime.
(A beaut, oh, a beaut, is the nurse!)

* * *

BOOM COMING? Russia has announced that she will meet and surpass America's atom bomb production, and she is known to be experimenting with stratospheric long-range bombers. There ought to be a big boom in the atom business pretty soon.

* * *

Even though we have the atomic bomb there isn't much hope that civilization will disappear.

* * *

Some of the CAA lawyers seem to have the theory that it stimulates the birdy instinct in flyers if they are made to eat crow.

that. It will unfold some real possibilities so long as we put real engineering into it instead of just inventors' hunches. And let's use a stroboscope, camera, oscillograph, and what not to help do a real job.

This precedent is *the insect*—the butterfly, the dragon fly, the moth, the bumble bee, the lowly house fly, and a thousand others, from microscopic size to inches across.

These are much better flyers than the birds and they have the advantage of flat wings that we can copy, and mechanism that can be understood and designed by man.

From a slow 50 beats per second by the dragon fly to 350 per second by the busy bees there is a range of study by camera and just brains alone that challenges the mind and stirs the imagination.

From now on we are going to let our minds wander into this field. But first let's see if we can find out for ourselves what a beating wing would have to do to really lift. Why haven't we done it before? Is it worth dropping our old stuff to tackle strictly as a new venture?

We certainly will not get much further with what we are working on now.

How does a beating wing get more lift out of a given area than we get in an airplane today?

Your present wing gets its lift from forward speed. Therefore it can never lift while standing still.

Close to the structure of a fly's wing is a palm leaf fan. Take one of these in each hand and run as fast as you can, holding them edgewise against the wind with just a small lifting angle. You will get very hot but you will get little lift even at your best running speed.

Beat one of the fans suddenly down flatwise against the air and if you are quick enough you can almost break the handle off the fan with the momentary lift you get. True it is only momentary—but it can be repeated as many times per minute as you wish if you can find out how.

But you do feel a lift many times that of the same area moving edgewise at slow speed. That is the sort of lift we must have for any type of direct hop off the ground.

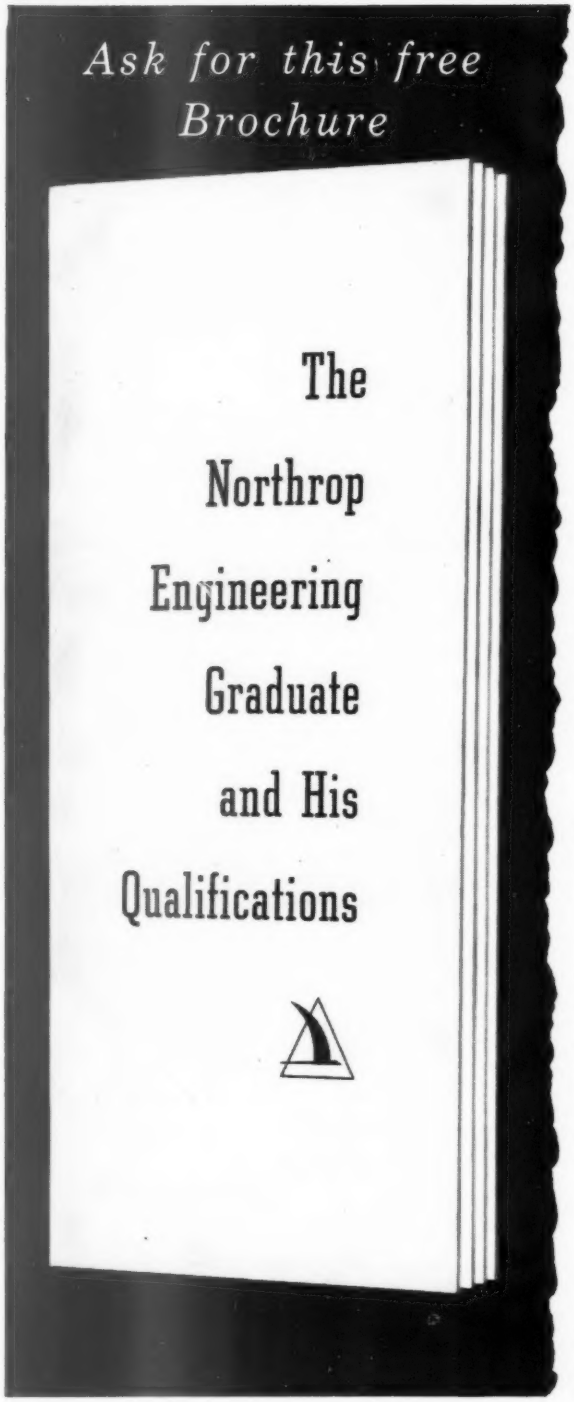
A surface hit down on the air can lift many times the amount it can lift from forward motion at the take-off speeds of present planes. Here is a clue. *The slapping fan can lift with no forward velocity.* Maybe we can use the "forward velocity" part to lift on the up stroke, and the beating power on the down.

Best way is to take a fan, or one of your own man-made counterparts in the shape of a fly's wing, and find out.

At any rate, here is something to dream on until the next article. Here is a seed. Some of the sketches draw on your imagination as to how fly-type ships might look. But don't laugh. Seeds grow. It might be that one of our readers could uncover the answer. It certainly isn't too crazy; it has already been done for millions of years. The scale effect is mostly on our side.

And there will be more; and more to the point, next time. END

Ask for this free Brochure



NORTHROP
Aeronautical Institute
Division of Northrop Aircraft, Inc.
1519 East Broadway
Hawthorne, Los Angeles County, California

APPROVED FOR VETERANS

Learn what it means to be a Northrop Graduate

This brochure has been placed in the hands of 750 top executives of aircraft manufacturing firms and air transport companies by the Graduate Placement Department of Northrop Aeronautical Institute—to inform them of the Northrop-trained man's superior qualifications. It will tell *you* the important advantages *you* can enjoy during your training, upon entering Aviation, and throughout your career.

Here are the answers to...why the *Northrop-trained man* is in demand...why *Northrop* graduates hold important positions with many leading aviation firms throughout the world...how *Northrop* training prepares men for better starting jobs, more rapid advancement, and successful careers.

Read this description of training at a technical institute that is part of a famous aircraft company, a school in the midst of important research, development, engineering, manufacturing, and maintenance activities...where you get many advantages that make your first job simply a continuation of the practical duties in which you gained experience during your *Northrop* training.

You will want to read this brochure...if you are interested in Aviation...if you want to make the most of Aviation's big opportunities. Send the coupon for your free copy.

Northrop Aeronautical Institute offers:

Aeronautical Engineering–2-year course. Curriculum approved by Engineers' Council for Professional Development.

Aircraft and Aircraft Engine Mechanics–50-weeks course. Approved by Civil Aeronautics Administration as preparation for A & E certificate.

NORTHROP AERONAUTICAL INSTITUTE
1519 East Broadway, Hawthorne, Los Angeles County, Calif.

Please send my free copy of "The Northrop Engineering Graduate and His Qualifications," also the Institute catalog and complete information on Northrop training, including starting dates of classes. I am interested in:

☐ Aeronautical Engineering ☐ Aircraft and Engine Mechanics (A&E)

Name _____

Address _____ Age _____

City _____ Zone _____ State _____

Check one: ☐ Veteran ☐ In Service ☐ Civilian

Jets in Combat

(*Continued from page 27*)

down by this type of coordinated firing.

The rocket-propelled Me-163s had only a few minutes duration at full power. The Allied fighters soon took to following them down after an attack and destroyed many as they came in to land. The Me-163 pilots had to develop new tactics of diving away rapidly after their attacks —a maneuver that was physically very hard on them.

It would be quite wrong to imagine that American reciprocating-engined fighters could fight the German jets with complete success, but they were not completely helpless against them. They always had the weight of vastly superior numbers on their side.

The German jets were especially successful against the British *Mosquito* bombers which had been too fast for the conventional German night fighters. The *Mosquitoes* were used for night raids, and a squadron of Me-262s stationed near Magdeburg was detailed to attack them. The jets were vectored to the *Mosquitoes* by a fighter director officer on the ground working with radar, and it was not unusual for a single German night fighter to bring down three or four enemy planes in a single hour's flight.

On the whole, it is generally conceded that the German jet planes were far superior to anything they faced during the war, and if they had existed in quantity—which they would if the war had lasted six months longer—they would have turned the tables on the strategic bombers—perhaps even gained tactical control of the air as well. Nevertheless, World War II did not produce any tests of jets versus jets, nor conclusive tests of many of the other new combat developments which would bear upon future jet warfare.

What are some of these developments?

We can understand them better if we first study a single jet airplane. The XB-46 is a modern jet bomber, still undergoing Air Force tests, about which we have a fair amount of data. Although it is not operational, it is representative of the advantages—and problems—of jet bombers. A bomber is chosen because it is the decisive weapon carrier.

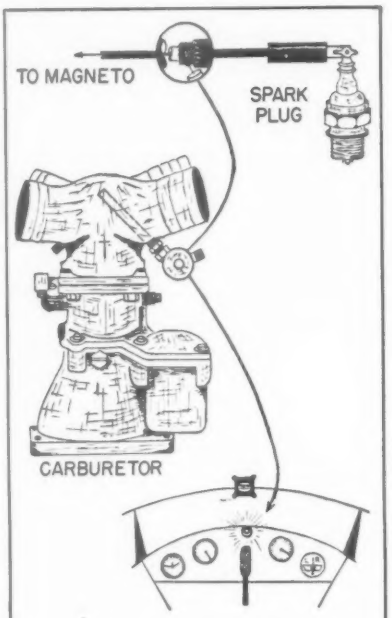
The XB-46 is built by Consolidated-Vultee Aircraft Corporation. Let's compare it with a later version (B-24J) of the widely used *Liberator* bomber of World War II built by the same company.

Each has four engines—the *Lib* four Pratt & Whitney reciprocating engines, the XB-46 four General Electric-Allison jets. It is difficult to compare their power, since they are measured by different standards. The Liberator's engines are rated at 1,200 horsepower each, the XB-46's at 4,000 pounds of static thrust each, equal to about 4,000 h.p. each at 375 m.p.h.

Wing span is quite similar, 110 feet for the *Liberator*, 113 feet for the XB-46 but there is a great difference in length—the *Lib* is only 67 ft. $1^{3}/_{16}$ in. long, the XB-46 is 106 feet long. Height is 17 ft. 11 in. for the *Liberator*, 24 feet for the jet plane.

The XB-46 can operate efficiently at higher altitudes than the *Liberator;* it has a much greater bomb load (20,000 pounds compared with 8,000 pounds); it weighs more (gross weight 91,000 pounds compared with 56,000 pounds); it is pressurized where the *Liberator* is not. Instead of using rubber de-icer boots, it has thermal anti-icing.

But the main difference is in speed. The *Liberator's* maximum speed is officially "over 300 m.p.h." The XB-46's maximum speed is officially "over 480 m.p.h." In only one respect is the *Liberator's* performance superior and that is in range. It has a tactical radius of perhaps 1,550 miles, while that of the XB-46 is officially "more than 800 miles."



ICE DETECTOR

NEW carburetor ice detector can be installed on six series of Continental engines. Electricity is obtained from ignition harness. When circuit is unbalanced by ice forming on ice pick-up unit installed in carburetor, a small neon tube flashes in cockpit to warn pilot. Detector is made by Lindberg Instrument Company, Berkeley 2, Calif.

There is another remarkable difference between these two airplanes. The *Liberator* carries a crew of five to 11 men—most often eight to 10. The XB-46 carries only three. The pilot and co-pilot do not sit side-by-side as in conventional bombers but in tandem. The third crew member is the bombardier, who rides in the transparent, streamlined nose. He doubles with the co-pilot in handling the duties the crew members of the *Liberator* had to perform.

Why are there only three crew members in the XB-46? They are limited in number because of a theory—with which many experienced officers disagree—that the plane is so fast that the gunners who made up the crews of World War II bombers will be unnecessary in future combat. Their reasoning takes something of the following line:

An enemy plane approaching the XB-46 from head-on could get no more than one pass at it. The two planes would be approaching each other at a combined speed of more than 1,000 m.p.h. —$16^{2}/_{3}$ miles per minute. From head-on, therefore, the two craft would be within a one mile range of each other for less than four seconds. They would be within a quarter-mile range of .50-caliber machine gun fire for less than one second. There would not be much time for the gunners of either plane to be very effective with conventional armament.

What about shooting down the XB-46 from the rear? Again, according to the theorists, fighters must have a 25 per cent speed advantage to close effectively in combat. Some of the new jet bombers do have rear gunners but at present it is virtually impossible to build even a jet fighter with a 25 per cent speed advantage over the fastest of the jet bombers. Indeed, there is probably not 10 per cent difference between them at present, though specific details are restricted.

The XB-46 with its four jets is known to be slower than the new six-jet bombers, but assuming that its speed is only as fast as the admitted 480 m.p.h., a fighter—again according to theory—would have to have a maximum speed of one-fourth more than that, or 600 m.p.h., to attack the XB-46 consistently. The combat version of the P-80 is officially rated at about 570 m.p.h., and the P-84 at 590 m.p.h. That would make both of them too slow.

When the new jet bombers start pushing 600 m.p.h., as is already reported, fighters would have to go far faster than any have yet flown to cope with them. The world's speed record under ideal conditions is only 650.606 m.p.h., and that was for a specially built test racer, the Douglas *Skystreak*, which carried no armament.

But—the theorists may be wrong. Some of them had the same ideas about bombers during World War II—with more than disastrous results. Even the heaviest-armed bombers were shot down from above and from quartering attacks by planes which did not have a 25 per cent speed margin over them.

The theorists overlook the fact that jet fighter planes may not be used against bombers. There are rocket planes and there are rocket missiles.

It is reported that Russian aircraft have been timed flying more than 800 m.p.h. by American radar operators in Korea. If true, these could be advanced versions of the German Me-163 rocket fighters which would be formidable adversaries indeed for any jet bomber. The rocket fighters have short range but they are probably faster than any conventional turbo-jet plane can be for a long time.

In the latter part of the war, the Germans had two or three short-range ground-to-air missiles almost ready which, with further development, might

Fly Your Own
Family car of the Air

1. You have a big "edge" on competition when you use Cessna's *Family Car of the Air!* It cuts "road time"—increases *productive* time—tremendously. And you can take important customers and associates with you! Operating costs per passenger are only a fraction of rail or airline fare!

2. It pays for itself in extra profits . . . then adds fun to week ends and vacations. For here is a low-cost plane that carries *four* comfortably! Wide doors. Wide seats. Luxurious cabin! And its cruising speed of over 120 m.p.h. and 500-mile range permit you to go almost anywhere you like!

3. Who'll fly it? . . . You, of course! This plane is so stable, so dependable, so easy to land the average man or woman—sixteen or *sixty*—can learn to fly it quickly. In no time at all, it's as simple as driving an automobile . . . *more* comfortable and relaxing, in fact!

SEE THE 170: *All-metal structure. 145 H. P. Continental Engine. Full-range wing flaps. Patented Safety Landing Gear. Top speed—over 140 m.p.h.*
WHEEL PANTS OPTIONAL

ONLY CESSNA OFFERS
A COMPLETE LINE OF PERSONAL PLANES!

CESSNA 120-140

Practical 2-place, cross-country planes at light training plane prices! All metal structure. Patented Safety Landing Gear. Many comfort and safety "extras." The 140 has a 90 H. P. engine and cruises at nicely over 105 m.p.h. The 120 has an 85 H. P. engine and cruises at over 100 m.p.h. Both have ranges of more than 450 miles.

CESSNA 190-195

These planes are luxurious 4-5 place personal or company *airliners* . . . with airline-type engines, Hamilton Standard Constant Speed Propellers, every comfort and safety feature! The 195 has a 300 H. P. Jacobs Engine and cruises at well over 165 m.p.h. The 190 has a 240 H. P. Continental Engine and cruises at over 160 m.p.h. Both have ranges of more than 700 miles.

See Your Cessna Dealer

MAIL THIS COUPON

Cessna Aircraft Co., Dept. F, Wichita, Kansas. Please send free literature giving complete description of the Cessna 170 ( ); Cessna 120, 140 ( ); Cessna 190, 195 ( ); Literature for model builders ( ).

Name.....
Street No.....
City..... County.....
State..... Phone No.....

make all bombers obsolete. *Rheintocher R1* was a rocket-propelled weapon guided by radar and designed for use against planes. Its top speed was over 1,000 m.p.h. *Wasserfall* had a proximity fuse designed to explode if it came within range of an enemy plane. *Schmetterling* had a speed of over 620 m.p.h. and homed on bombers by sound and sighting devices. Professor Wagner of Junkers, who designed it, stated *Schmetterling* was so accurate that one bomber would be destroyed for every missile fired.

True, we are dealing with actualities and not theoretical developments, but if British intelligence authorities are correct, these weapons were almost ready at the end of World War II. With accelerated development they could be ready today.

Armament has also undergone a revolution. If one or two seconds is too short a time for a human being to train guns on an enemy aircraft, radar can train, track and fire them almost instantaneously. Proximity fuses and target-seeking warheads are already operational.

If we examine the XB-46 closely we will observe some of the problems inherent in all high-speed designs. The fuselage is long and slender; the wings are exceptionally thin. This makes for difficulty in disposing of the landing gear. In the XB-46 the forward gear folds into the nose while the main wheels fold into extra large nacelles which cover both jet engines in each wing. The wings, of course, are so thin there would be no room to stow conventional gear. Special wheel designs and revolutionary small high-pressure tires have been developed for other planes. The Martin XB-48 and Boeing XB-47 use heavy tandem wheels under the main fuselage, and light outrigger wheels off the wings or nacelles to balance the load.

A more troublesome problem is carrying fuel supplies. The knife-thin wings can lug only a fraction of the fuel of old-type bomber wings. The fuselage also has a much smaller cross-section and must be made longer to gain volume. This, coupled with the fact that jet engines burn more fuel at cruising speeds than reciprocating engines, is responsible for their shorter range.

We are only now learning what our operational problems are. The Air Force is trying to gather tactical data as rapidly as possible. The air arms must know the difficulties of coordinating jet plane performance with combat maneuvers and group operations. They don't know them at present.

At present the planners are thinking in terms of four types of fighters, for example. *Interceptors* are intended for the destruction of enemy bombers and missiles by daylight. *All-weather* fighters are designed to intercept bombers and missiles and to escort bombers in bad weather and at night. *Parasite* fighters are intended to accompany bombers on extremely long range flights and are only released from the bomb bay when they are needed. The fourth class of fighters is labeled *"penetration"* and is designed to attack enemy fighters and tactical targets, for ground support, and for escorting medium range bombers.

Yet development of a single successful ground-to-air missile like *Schmetterling*, 100 per cent accurate, would make all bombers virtually obsolete. Therefore all fighters designed to escort or to shoot down bombers would also become obsolete. A successful dependable ground-to-air missile would make the first three types of fighters unnecessary.

The Air Force planners will promptly snort "pipe dream" at this idea. But after all, that's what the Navy snorted at Billy Mitchell's bombers.

The bombs of World War II are as obsolete as the planes. Their shapes are so poor aerodynamically that no one knows where they would hit if released at high speeds. If released at 600 m.p.h. they would probably tumble all over the sky, shedding fins, and possibly detonating themselves by the violence of their own gyrations. The new bombs have to be true aerodynamically. Their surfaces have to be as smooth as the airplane that carries them. They can no longer have contact fuses but must be discharged electronically.

Experience with the F-80 illustrates some of the other new problems. It is hard-shooting, easily controllable and can be used for strafing ground troops. But it is too fast. Our best rate of fire today is around 1,200 rounds per minute. The time between bullets is $\frac{1}{20}$ of a second. In that time a 600 m.p.h. fighter moves 44 feet. An entire airplane could pass directly in front of the bullet stream of an F-80 and not be touched.

The F-80 has excellent dive-bombing characteristics, but the general question arises whether jet planes are so fast that the bombs must be released too far from the targets for good accuracy. The F-80 is a superb photographic plane (the F-84, because of its nose intake, is not). But to use it, it is necessary to revamp weather forecasting to cover the altitudes between 30,000 and 40,000 feet.

There are hundreds of other questions and not always answers for them. Will fighter cover for bombers be effective, for example? Can high-speed jet bombers or fighters fly formations? Should they? What are the best flying altitudes and the best bombing altitudes? What are the weather problems? What about building combat airstrips for planes that require such long runways? (The F-84 lands at 150 m.p.h.) Even the bombsight tables have to be reworked for the new speeds and the new bombs. Only long experience in service-testing these planes can give the answers. END

THE SHORT CIRCUIT BOYS

"THE Short Circuit Boys" is the group nickname of (left to right) Jim Riddle, A. R. Applegarth, and Rudy Garfield, of National Aeronautical Corporation. The Riddle-Applegarth-Garfield combination got its "Short Circuit" nickname for nullifying ignition noise. They found a system for shielding the radio instead of the engine. Their company also produces a feather-weight marker beacon receiver, permanently tuned to 75 megacycles. An over-riding tone informs the pilot when he is over a fan marker—usually located 20 miles out from major range stations. The receiver also gives positive identification of the cone of silence.

Their major development is the tiny Narco VHF transmitter attachment (held by Riddle) which is used with a regular transmitter to make an ordinary lightplane radio reach out as far as 150 miles. Complete with antenna, the attachment weighs only 22 ounces and is no larger than a half carton of cigarettes.

"SAFEST PLANE TO FLY," SAY NAVION OWNERS

"FORGIVES" ANY ERROR SHORT OF FOOLHARDINESS

"Smoother, easier flying"... "like driving your car on a paved highway." That's what more than a thousand pilots who have chosen the *Navion* report. The explanation is simple. The *Ryan Navion* has a unique balance of safety, speed, ruggedness and comfort. In utility and dependable operation, it best meets the need for a thoroughly modern business plane.

From take-off to landing, the *Navion* lets you relax as does no other plane in its class. Aerodynamically and structurally it takes the roughest air with safety and comfort. *There's a confidence and satisfaction in your plane that only Navion pilots know.*

The *Navion's* stall-resistant wing is ingeniously designed to give full aileron control at speeds so low you'll be amazed. And, if you're bothered by Sunday flyers, those seven big windows give 360° visibility that makes flying or taxiing in traffic safe, easy.

Extra strength, extra ruggedness are built into the *Ryan Navion's* all-metal, thick-skinned wings, fuselage and tail surfaces. You enjoy an extra measure of safety and dependability. You get easier maintenance at lower cost and more permanent beauty.

Ryan Navion's variable-pitch propeller and powerful 185 hp engine deliver short take-offs with plenty of reserve power—even with maximum loads and from high altitude fields. Cruising speed is 150 mph. Optional auxiliary tank steps maximum range up to 750 miles.

Not only is the *Navion* a safe airplane that's fun for the novice, but veteran pilots will quickly recognize the efficient combination of all the things they've always wanted in a personal and business plane. What's more, the *Navion* converts to carry 645 lbs. of cargo, with removable canopy for easy bulk loading up to 55 cubic feet.

For illustrated booklet, a complete flight demonstration, or your next business or pleasure trip as a guest of your *Navion*

ONLY YOUR OWN HAND ON THE WHEEL can adequately demonstrate the *Ryan Navion's* amazing simplicity of control. Inter-connected ailerons and rudder—a patented *Navion* feature—give automatic co-ordination . . . "two-control" after take-off! You get on-course, fingertip flying with wheel alone, your feet on the floor, even in perfect turns. But you have rudder control when you want it for torque, cross-winds, take-offs and landings. Pilots *relax* in the *Ryan Navion*.

FOUR ENJOY AMPLE ROOM in the *Navion's* sound-proofed, draft-free, smartly styled cabin. Exclusive roll-back canopy gives easier exit and entrance for rear seat passengers. Can carry 180 lbs. of luggage in spacious trunk-compartment.

SHORT, ROUGH FIELDS AND CROSS-WINDS are no problem with the *Navion's* high-lift, full-deflection flaps, sturdy tricycle landing gear, oversize tires, wide wheel tread, hydraulic shocks and brakes and extra-large, *steerable* nosewheel.

The Thoroughly Proven Post-War Plane

Ryan Navion

Midwest State Fairs

(Continued from page 40)

next few days: Iowa at Des Moines, August 27 through September 3; Minnesota at Saint Paul, August 28 through September 6; and Indiana at Indianapolis, September 3 through 10.

The last few days at the Wisconsin Centennial are gala-filled, with the American Motorcycle Championship races scheduled for August 28 and the country's first 200-mile AAA auto championship race on August 29. Preceding these two events, Grand Circuit Harness Races will be held from August 23 to 26.

Among outstanding exhibits at the Wisconsin Exposition are a three-acre, $100,000 Conservation show, including an actual waterfall and a flowing stream stocked with fish. The exhibit includes wild animals native to Wisconsin, roaming in their natural habitat.

Several airports are located near the Wisconsin Fair Grounds. Maitland Lakefront Airport, with a 2,450-foot north-south runway, is eight miles from the grounds, but streetcar rides to the fair cost only 10 cents. Taxi (one to five persons) costs $1.15. For flyers who want to spend the night in Milwaukee, Maitland is especially convenient since it is within walking distance of the downtown section.

From Wisconsin Skyways, Inc., at Hales Corners, Wis., pilots can catch an interurban running to within two blocks of the fair grounds entrance. Fare is 25 cents. A. A. Gardner, manager of the airport, says the airport car will take flyers to and from the interurban. Gardner will have information for fair visitors, and offers to assist them in obtaining reservations at hotels and tourist courts. He says, however, that flyers would be wise to make reservations at hotels in advance during the period of the fair.

From General Mitchell Field (the Milwaukee County Airport), there are street car and bus connnections to the fairgrounds (10 cents). Taxi fare to the grounds is $2.25.

Iowa State Fair

Iowa's State Fair, known as America's largest agricultural and livestock show, annually attracts between 6,000 and 7,000 head of prize livestock from about 20 states. Cash prizes at this year's livestock show total over $100,000.

The Iowa exposition in Des Moines includes the national livestock show, with judging in progress continuously in eight rings from August 27 through September 2. The fair includes the Iowa Farm Boys' and Girls' Junior State Fair, a state agricultural show, a floriculture exhibit, the Iowa Horticultural show, and a Statewide Women's Exposition (occupying two buildings). There will also be a Fish and Game Show, a Farm Machinery Exposition (with over 40 acres of new farm equipment), Iowa art and photographic salons.

Special entertainment highlights at the Iowa Fair include:

National circuit championship auto races on the afternoons of August 27, August 29 and September 3. Over 40 racers are entered. Double-feature horse races, including both harness and running, will be held on August 30, August 31 and September 1. Over 200 entries have been received in these events with purses of approximately $16,000.

On August 28 and September 2, auto "thrill shows" will be held, with daredevil stunts such as head-on collisions, flaming wall crashes, dynamite smashups.

Every night from August 27 through September 3, a three-hour musical show, "The Fair Revue," will be presented by Broadway chorus girls, stage and radio stars, and entertainers. An outdoor circus with 15 acts will be held every afternoon and evening, and special fireworks displays will be given each night.

Other special features of the Des Moines fair are: carnival on a 10-acre midway, a farmer's horseshoe-pitching tournament each day from August 28 through September 3, a draft-horse team-pulling contest September 1 through September 3, and an Old Fiddlers' Contest on August 27 and 28.

The two airports near Des Moines are Municipal Field and Dodge Airport. The Municipal port (at Southwest 21st and Army Post Road) is about 20 minutes by car from the fairgrounds. Visiting flyers can either take a taxi to the fairgrounds, or can take the airport limousine to downtown Des Moines where a streetcar connects to the fairgrounds. Distance from Municipal Airport to the fairgrounds is eight miles and taxis charge 35 cents per mile. No tiedown fee is charged at the Municipal Field, provided visiting planes furnish their own tiedown equipment. A. E. Thomas, airport superintendent, suggests that visiting flyers contact the following Des Moines hotels for reservations during the fair period: Brown, Fort Des Moines, Kirkwood, or Savery.

Minnesota State Fair

The Minnesota State Fair begins on August 28 and lasts through September 6, with auto races scheduled for August 28 and 29 and September 5 and 6. Harness races will be held on August 30 and 31, and on September 1 and 2. Other features of the fair are:

Thrill shows on two days, September 3 and 4.

State Fair Revues and fireworks each night.

Royal American Shows on the midway each day and night.

Huge cattle, swine, sheep and horse exhibits will be held, as will an 80-acre farm machinery and home appliances exposition. The Future Farmers of America will conduct a livestock show, and mammoth agriculture, horticulture, and bee and honey exhibits are planned. Of par-

SOME AIRPORTS SERVING MIDWEST STATE FAIRS

Airport	Phone Number	Distance to State Fairgrounds	Number of Runways	Length of Longest Runway	Gasoline Grades	Service Facilities	Write to:
INDIANAPOLIS, INDIANA							
Weir-Cook Municipal	Belmont 4563	Fairgrounds 9 mi.	4	5148 ft.	All Octane	Complete Repair Facilities, A&E.	P. H. Roettger, Superintendent.
Sky Harbor	IR-5339	Fairgrounds 7 mi.		5280 ft.	80-91 Oct.	Approved Repair Station.	Gordon Lackey, Sky Harbor, 8500 E. 21st St., Indianapolis 44, Ind.
Brightwood	CH 8217 CH 8218	Downtown Indianapolis 3.5 mi.; 15 minutes from Fairgrounds	3	3750 ft.	80 Oct.	Minor A&E Repairs.	Carl M. Smith, Brightwood Airport, 4100 Mass. Ave., Indianapolis, Ind.
MINNEAPOLIS-ST. PAUL							
Holman Field	Garfield 4306	Fairgrounds 5½ mi.		5,500 ft.	80-91 Oct.	Major & Minor Repairs.	F.J. Geng, Airport Director, Holman Field.
Wold-Chamberlain	Dupont 2326	Fairgrounds 12 mi.		5,884 ft.	80-91-100 Oct.	Major & Minor Repairs.	L. D. Hammond, Airport Director, Wold-Chamberlain Field, Minneapolis 6, Minn.
University of Minnesota	Nestor 7517	Fairgrounds 8 mi.	3	3,450 ft.	80 Oct.	Complete Shop facilities; OAMI	George G. Irvine, Airport Mgr., U. of Minn. Airport, New Brighton, Minn.
Fleming Field (South St. Paul Municipal)	LaSalle 6771	Fairgrounds 12 mi.		1,500 ft.	80-91 Oct.	Major & Minor Repairs.	Kenneth E. Wilson, Acting Mgr., Fleming Field, South St. Paul, Minnesota.
DES MOINES							
Des Moines Municipal	3-0614	Fairgrounds 8 mi.	4	5,700 ft.	80-91 Oct.	Major Repairs	A. E. Thomas, Airport Supt., Des Moines Muny Airport, Des Moines, Iowa
MILWAUKEE							
Maitland Lakefront	Broadway 2-7747	Fairgrounds 8 mi.		2,450 ft.	80-91 Oct.	Major Repairs	W. J. Fitzner, Manager
Wisconsin Skyways (at Hales Corners, Wis.)	620	Fairgrounds 7 mi.		2,400 ft.	80 Oct.	Minor Repairs	A. A. Gardner, Wisconsin Skyways, Hales Corners, Wis.
General Mitchell			4	5,000 ft.	80-91-100 Oct.	Repairs	Maj. Stanley Piasecki, Airport Manager, General Mitchell Field, Milwaukee, Wis.

Lear

ORIENTER*

Automatic Direction Finder

(RADIO COMPASS)

Users Say:

"The Lear Orienter installed in my Bonanza is a great advancement in the navigation of all aircraft. I am proud of it. Regards,"

BILL ODOM: Roslyn, N. Y. (Round-the-world Flyer)

"Thanks to the Orienter I saved 6 days on my return flight to Chile — due primarily to the long range accuracy of your direction finder,"

I. BUNSTER: Santiago, Chile (Bunster & Bezanilla, Ltd.)

". . . Greatest instrument ever made to insure the lives of aircraft owners. I will never fly another plane without the Lear Orienter . . ."

FRED R. GEARHART: New York City (Gearhart and Company)

"Your Lear Orienter is a wonderful piece of radio navigational equipment. It is the best I have ever seen . . ."

PAUL BUTLER: Hinsdale, Ill. (Pres., Butler Paper Co.)

• Over the high peaks of the Andes, or across the varying terrain of North America, or around the entire world — the

Lear ORIENTER POINTS THE WAY

Pilots everywhere are enthusiastic in their praise of this reliable automatic direction finder. The Orienter is a real aid to navigation, is light in weight — only 24 lbs. — and gives airline radio performance in any aircraft. For complete details, write Lear, Incorporated, Grand Rapids 2, Michigan.

V. H. F. TRANSMITTER

A three-watt very high frequency transmitter unit which can be inserted in the same container with the Lear Orienter — weighs only twenty-one ounces.

Lear INCORPORATED

Only 24 lbs.

THE NAME MEN FLY BY

Do As Big Airlines Do—

★ ★ ★

Depend on WEEMS for Navigation Instruments!

For accurate navigation you need instruments you can absolutely rely upon. That's why it pays you to select your requirements from the famous Weems line where you'll find many instruments which are standard equipment with U. S. Army-Navy Air Forces and major airlines, Eastern, Pan-American, TWA and many others. Navigation "musts" for pilot and student alike are the Weems Mark II Aircraft Plotter—and the Dalton E-6B or Mark VII Computer.

WEEMS MARK II PLOTTER — For sectional and world air charts. Used for plotting bearings, courses, lines of position—constructing wind diagrams and angles. Only $2.

DALTON E-6B COMPUTER —Two sides —one for solving all vector and DR problems—the other for solving fuel consumption, speed - time - distance, nautical-statute mile conversion problems and correcting altitude and air speed for temperature and pressure. Just plot free hand on transparent surface and erase. Only $10 complete case and instructions.

See your Aviation Supply Dealer—or write direct for FREE WEEMS catalog. Address Dept. 5, Weems System of Navigation Annapolis, Maryland.

AIR WSN WEEMS SEA SYSTEM OF NAVIGATION ANNAPOLIS MARYLAND

FOR YOUR Flying Holiday

THE Grossinger AIRPORT

LIBERTY, N. Y.

It's on the U. S. Coast And Geodetic Survey's New York Sectional Air Map (U-9)

Operated by LIBERTY FLYING SERVICE, Inc.

VERNON WRIGHT, Operations Director

FIVE MINUTES FROM THE Grossinger HOTEL & COUNTRY CLUB

For 36 Years One of America's Great Resorts

STAMMER?

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering — successful for 47 years. *Free—no obligation.*

GET THIS FREE BOOK!

Benjamin N. Bogue, Dept. 4810, Circle Tower, Indianapolis 4, Ind.

ticular interest to flyers will be a huge U.S. Army, Navy and Air Forces exposition.

The Minnesota Flying Farmers Association will have its annual meeting at the Minnesota State Fair on August 31, at the headquarters building of *The Farmer*, a northwest farm paper. The organization, headed by Tom Letnes, Nielsville, Minn., has 165 members. Paul J. Moore, secretary-treasurer of the Flying Farmers and a faculty member at the University of Minnesota, says the University of Minnesota Airport at New Brighton is used by most of the Flying Farmers. The port is about six miles north of St. Paul and Minneapolis and the fairgrounds. Moore says the University airport station wagon is available for use between the field and either city, and during the fair week to the State Fair Grounds.

Fleming Field, the South Saint Paul Airport, is approximately 12 miles from the fairgrounds. Streetcar fare from Fleming to the fairgrounds is 20 cents, and taxi costs about $4. Ruth Rahn, secretary at the airport, says the airport management will assist pilots in finding accommodations for the night. There is a restaurant on the field.

Wold-Chamberlain Field, the Minneapolis-Saint Paul metropolitan field, is also 12 miles from the airport. Taxi fares to the fairgrounds range from $2.25 to $2.35. Flyers stopping at the airport can contact the Airport Director's Office (Room 208 in the Passenger Terminal) for additional information.

Holman Field, another of the Minneapolis-Saint Paul metropolitan fields, is 5½ miles from the fairgrounds. The grounds can be reached by taking a taxi from the airport to downtown Saint Paul, and then a streetcar to the fairgrounds (cost, about 75 cents), or by taking a taxi directly to the fair (cost, about $1.50). The port is only about 1½ miles from downtown hotels.

Indiana State Fair

The Indiana State Fair Board assumed an "air-minded" attitude this year, with one of the members, Earl J. Bailey of Lowell, flying down regularly to board meetings from his farm home in northwestern Indiana. Bailey lands his *Supercruiser* in the infield of the Grand Circuit Race Track at the fair, only a short walking distance from the Administration Building.

Flying visitors to the fair, however, will have to land at one of the Indianapolis airports. The huge Weir-Cook Municipal Airport is nine miles from the fairgrounds. A dormitory for both men and women is located at the airport. Recommended transportation from Weir-Cook to the fair is by airport limousine service downtown and by taxi from there to the fairgrounds (total cost, $1.95). Large groups can charter buses directly to the fairgrounds by contacting the Indianapolis Transit Company. An airport bus leaves every 30 minutes for the downtown district (20-cent fare), and fairground buses leave from the city frequently (10-cent fare).

Also at Indianapolis (West 38th Street at Georgetown Road) is the Shank Airport, operated by Bob Shank, one of the first air mail pilots, whose aviation experience goes back to the bamboo sticks and chain-drive days.

Brightwood Airport and Sky Harbor are both well-equipped to handle an influx of planes, and transportation from these fields to the fairgrounds costs between $1 and $2.

The Indiana State Fair Grounds are located on 214 acres with 33 permanent buildings. Through the efforts of Mr. Bailey, the flying member of the State Fair Board, a special committee has been formed to greet and serve as host for visiting pilots. George C. Shull, public relations director for the fair, says Indiana is especially interested in having a large delegation of pilots at the fair and that every effort will be made to make their stay enjoyable.

An all-time high of $134,000 in purses will be offered in the Grand Circuit horse races on September 4 and 6, through September 10. A nationally-famous $50,000 horse show will be staged in the Indiana Fair's Coliseum September 5 through 10. Wayne King and his orchestra will play at the show, and King's daughter will ride one of his show entries.

More than 25,000 individual entries have been made in the various exhibits, ranging from milking goats to canned meats. Cash premiums offered at the fair exceed $300,000.

Whether flyers visit one of these State Fairs, or all of them, it is probable they will meet hundreds of aviation enthusiasts who are flying to the events for the first time. Each of the fair boards anticipates a large pilot-attendance, and the convenience of airports to the fairgrounds assures pilots of ample facilities.

CHARLES L. BLACK

Photo Credits

The following list shows the sources from which pictures in this issue were gathered. Where a single page is indebted to several sources, credit is recorded left to right, top to bottom:

4—HAROLD G. MARTIN
6—ROBERT R. RENFRO, CZECHO-SLOVAK METAL & ENGINEERING WORKS
15—USAF
16-17—HAL MORRIS, ACME
19-21—USAF
22—USN
23—USN, JULIAN S. KRUPA
24-25—HOWARD LEVY
26-27—CONSOLIDATED VULTEE
29—HAL MORRIS
30-32—WALTER STEINHARD
33—AIRCRAFT DEVICES CO.
34—WILLIAM B. STOUT, ACME
35—WILLIAM B. STOUT AND JULIAN S. KRUPA
36-37—DEL ANKERS
38-39—THE AEROPLANE
40—KENNETH M. WRIGHT, L. W. FARALL, FOSTER PHOTOS
41—HAL MORRIS
42—MALCOLM H. SMITH
43—SANBORN STUDIO, S. W. LOCK, CHARLES E. BROWN
44—BRITISH INF. SERVICE, DOUGLAS, WESTINGHOUSE, LUSCOMBE, DE HAVILLAND OF AUSTRALIA
45—REPUBLIC, MARTIN, INTERNATIONAL NEWS SERVICE
46—RICHARD H. BETCHLEY, USAF
48—CAA
50—N. R. STROHMEYER
54—LINDBERG INSTRUMENT CO.
56—ELLSWORTH SCHELL NEWS PICTURE SERVICE

"Air Supremacy" offers YOU a career!

TRAIN NOW AT AERO TECH

Training designed for your profit

Air supremacy demands the constant development of improved planes and techniques and the steady replacement of existing ships with these new developments. By the time this activity reaches its crest, the men who begin their training **now** will be ready for employment; and the quality of their training will determine their entire futures. The Industry's recognition of the high quality of AERO TECH graduates makes this school the best possible foundation for your aviation career. The demand for our graduates far exceeds the supply. **Our curriculum in MASTER AVIATION MECHANICS, AIRPLANE MECHANICS and ENGINE MECHANICS is planned in close consultation with executives of leading airlines and aircraft plants, and is constantly revised to keep up with their latest developments and techniques.** Shop and laboratory equipment parallels that found in airline shops and production plants. Here at AERO TECH you are taught HOW TO DO. All non-essentials are eliminated, yet thorough theoretical instruction is given to back up the practical work. You are assured of background and technical knowledge for QUICK job advancement, BETTER positions and MORE pay.

Even our daily schedule—7 a.m. to 1 p.m.—is planned for your profit, since it enables students to help defray their living expenses by accepting part-time employment.

An ideal location . . .

Situated at one of the largest airports in the famous San Francisco Bay area, AERO TECH is at the scene of the very activities for which its students are training. For leisure hours, this area offers year round golf, tennis, riding, swimming and many other outdoor activities. National parks and other scenic beauty spots are only a few hours away, while neighboring San Francisco abounds in such picturesque spots as Chinatown and Fisherman's Wharf.

APPROVED FOR VETERANS
APPROVED BY C. A. A.

AERO TECH Oakland

AERO INDUSTRIES TECHNICAL INSTITUTE

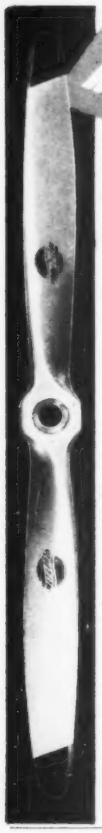
OAKLAND MUNICIPAL AIRPORT · OAKLAND 14 · CALIFORNIA

ESTABLISHED 1937 · O. D. McKENZIE, President

Please send me complete information on Aero Tech training. **MAIL THIS COUPON TODAY!** F-9

NAME _____ ADDRESS _____

CITY _____ ZONE _____ STATE _____ AGE _____



MET-L-PROP

The TROUBLE-FREE Propeller FOR PERSONAL PLANES

You have no complex and costly maintenance problems with the McCauley Met-L-Prop. No warping. No adjusting. Always in balance. Made of forged heat-treated aluminum alloy. Light, durable, CAA approved. You always get the *best* all-around flying performance with Met-L-Prop.

Now available for Stinson Voyagers, Cessna 170, Aeronca Sedan and planes powered with Continental 65 to 90 HP engines. Soon available for other planes up to 165 HP. Write for free folder.

MET-L-PROP FORGED STRENGTH McCAULEY CORPORATION

Without Question . . . . . Met-L-Prop is Best

See Your Dealer or Distributor Now

McCAULEY CORPORATION DAYTON 7, OHIO

Luscombe Observer — 90

(*Continued from page 37*)

tary airplane, one designed primarily for efficiency and secondarily for comfort.

If it's utility you're looking for, and you can use a two-place tandem monoplane that will cruise at about 110 m.p.h., the *Observer* is well worth examining. It is an attractive, rugged-looking airplane, is all-metal, and should make an excellent workhorse for farmers, ranchers, utility and oil companies (for line patrols), and newspapers (for photography, paper deliveries, etc.). In other words, the *Observer* should be a good candidate for almost any kind of utility flying other than the comfort and quiet of private flying that we would expect for joy-riding purposes.

The *Observer* I flew for this article (NC-1575B) was standard except for the 47-inch McCauley metal propeller; a wooden prop is standard equipment. The 47-inch prop is eight inches shorter in diameter than should normally be used. Its purpose is to improve the plane's short-field performance, a feature desired by the Air Force. The short prop lets the engine turn up at a terrific rate for the Continental; Dick Stratton, Luscombe representative in the Washington area, told me to hold the take-off speed down to 2,400 r.p.m. Even at that speed, the *Observer* zips out of a field in about six seconds from a standing start, with a full gross weight of 1,400 pounds.

The day I flew this airplane the weather was hot and sultry. The pressure altitude of the field was a good deal higher than the altitude shown on the map. Result, of course, was that the performance of any airplane under those conditions was reduced considerably. That probably accounts for the fact that I was only able to get a rate of climb of about 650 f.p.m., although the factory claims 850 f.p.m.

In the air, the *Observer* is easy to fly.

LUSCOMBE OBSERVER

One air-cooled 90-h.p. Continental engine
Type Certificate No. 694

Wing span	35 feet
Length	20 feet
Height	6 ft. 3 in.
Gross weight	1,400 pounds
Empty weight	870 pounds
Wing loading	10 lbs./sq. ft.
Fuel capacity	25 gallons
Top speed	125 m.p.h.
Cruising speed	112 m.p.h.
Stalling speed	48 m.p.h.
Range fully loaded	550 miles
Service ceiling	17,000 feet
Rate of climb (sea level, gross weight)	850 f.p.m.

Source: Luscombe Aircraft Corp., Dallas, Tex.

The controls and cabin layout are familiar to most lightplane pilots. One exception is the location of the throttle; apparently Air Force requirements called for the throttle to be installed on the left-hand side of the cockpit, where the *Observer's* throttle is, instead of in the center of the instrument panel. Otherwise, the same Luscombe control stick is there. So are the small rudder pedals—and that abomination common to all Luscombes to date, heel brakes. Once again I found myself veering a Luscombe all over the runway while trying to get my big feet onto the clumsy little heel brakes which Luscombe engineers apparently are going to retain through thick or thin. Safest thing a new pilot can do is to not even try to use the brakes until the airplane safely slows itself down after a landing.

Aside from the chronic braking problem, maneuverability on the ground is excellent. The steerable tail wheel is quite effective; you shouldn't need the brakes except for the engine runup before takeoff. Visibility, of course, is excellent too. And taxiing this airplane on rough ground is quite simple and comfortable, thanks to the new Silflex landing gear which is Luscombe's answer to the Cessna spring-steel landing gear. The Silflex gear appears to have all the stability and safety features of the Cessna gear, although it is somewhat stiffer. It does, however, do away entirely with the ground-looping tendencies once so common with early Luscombes.

Maneuverability in the air is quite satisfactory, and somewhat startling if you happen to look around through the various windows. A steep turn, for instance, looks a lot more drastic in this airplane; you can look back and see the world cocked at an angle, and nearly all of the *Observer's* tail unit is visible. And even in level flight it's somewhat startling to look down; the whole of both sides of the airplane are window, enabling pilot and passenger to see clear under the plane.

Rebat *Finest Aircraft Batteries*

are original equipment in most personal planes.
Replace with the finest . . . Ask for Rebat!

by READING BATTERIES, INC., READING, PA., U. S. A.

"ALL THIS—

and $336 a month!"

"SEPTEMBER 18 is Air Force Day—a good day to find out about the opportunities open to you in the U. S. Air Force. For example, take a look at what I'm getting as an Air Force pilot:

- silver wings and a commission in the Air Force Reserve,
- a crack at a Regular Air Force commission with a good chance of being accepted,
- a chance to fly the world's best planes as a member of a famous Air Force squadron,
- valuable administrative experience as well as a broad technical background,
- close contact with the latest developments in aviation including new planes, improved equipment, the last word in electronics, jet propulsion, remote control flying,
- a chance to apply for advanced courses at any of a number of service schools and — if you earn a regular commission — to attend a leading civilian university,
- to top it all off, up to $336 a month pay—*more than $4000 a year!*"

These can be all yours, too, if you can qualify for Aviation Cadet pilot training and can complete successfully the 52-week training course. To be eligible, you must be unmarried, between 20 and 26½ years old, and have at least half the credits necessary for a college degree (or pass an equivalent examination).

Visit your nearest Air Force Base or attend the special events in your community on Air Force Day. Talk to the Air Force personnel you meet there. Make an appointment to take your examinations for Aviation Cadet training.

U. S. Army and U. S. Air Force Recruiting Service

WIN YOUR WINGS WITH THE AVIATION CADETS

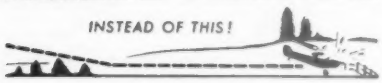
Next class starts October 15, 1948

STOP WHERE YOU WANT!
With "SAFELAND"
C. A. A. APPROVED
Safety Landing Device
provides

STEEPER DESCENT ANGLE • SHORTER LANDING ROLL

GIVES YOU THIS!

INSTEAD OF THIS!



"SAFELAND" is a patented and C. A. A. approved device that permits full application of the brakes immediately after landing. It also reduces the landing roll 50% and more in all types of light planes tested.

"SAFELAND" also tends to steepen the glide angle of ships not equipped with flaps and is a definite aid to taxiing in strong and gusty surface wind conditions.

The installation of "SAFELAND" is simple and entirely internal. Nothing outside the ship to alter its appearance.

Write for full particulars today!

Aircraft Devices Company
CENTRAL AIRPORT, CAMDEN, N. J.

PILOTS

INCREASE YOUR EARNING POWER!
Get Your
INSTRUMENT and AIRLINE
TRANSPORT RATING *Now!*

Train at AMERICAN FLYERS—the world's largest Instrument and Airline Transport School—and insure YOUR future in aviation. American Flyers has trained more pilots for the Airlines than any other school in the country—MORE THAN ALL OTHER SCHOOLS COMBINED!

If you want the most modern and efficient flight instruction—whether you are a veteran or civilian pilot—write to us for our free booklet outlining the courses we have to offer.

VETERANS—Your certificate of eligibility from the Veterans Administration is all you need to enroll at government expense for any of our courses under the G.I. Bill of Rights!
Courses start at any time—no waiting!

AMERICAN FLYERS

MEACHAM FIELD FORT WORTH 6, TEXAS

MAIL THIS COUPON TODAY

Please send me FREE Booklet F and data on
☐ INSTRUMENT ☐ AIRLINE TRANSPORT ☐ CIVILIAN ☐ VETERAN

NAME_____

STREET_____

CITY_____ STATE_____

As is true of nearly all Luscombes I've ever flown, the *Observer* has excellent stability. It is easily trimmed in flight. The trim tab, incidentally, also reflects the military touch. It is a large knobbed wheel on the left side of the cabin, about as far back as the pilot's shoulders. Thus it is accessible to both pilot and passenger. Once trimmed, the *Observer* can be flown hands-off indefinitely.

The stall is normal and peaceful. With power all the way off (although the engine appeared to idle a bit fast, apparently because of the smaller prop), the plane stalled at an indicated air speed of 50 m.p.h. When it stalls it just mushes forward; a little forward pressure on the stick quickly picked up flying speed.

Cruising horsepower (67.5 of the engine's 90 h.p.) is delivered at 2,350 r.p.m. At that speed the airspeed indicates about 100 m.p.h. at 2,000 feet above sea level. I flew a triangular course under those conditions and got an average ground speed of 108 m.p.h.

The approach and landing is done in the normal manner, although I did the sloppiest job with the *Observer* I have ever done, even in the early days of my flying. The airport—Hybla Valley Airport, near Washington—sits down in a bowl, with high hills and trees at the approaches to the two runways I used that day. Though the *Observer* does float, and it was not possible to slow down the engine to what would seem to be normal idling speed, I overshot that field three times running, the airplane each time floating clear down the runway, hardly losing altitude at all. At first I was gliding at about 70 m.p.h., then got it slowed to a glide of 65 m.p.h. Then I tried slipping. I finally got it down (after about 10 minutes) by flying it in a near-stall, just over the treetops, then letting it mush onto the runway. I even made one hard landing that way, and the Silflex gear gave me a nice comfortable ride. I would have felt more comfortable about slowing it down more over those trees if the airplane had been equipped with a stall-warning indicator.

There are few of the comforts of home in the *Observer* cabin. But talk about room! This tandem is as wide as a side-by-side ship. The pilot's seat is comfortable enough, but apparently was intended mainly to take a military parachute strapped to a liaison pilot. The back seat is little more than a cushion on a metal shelf which sort of slants from the top of the fuselage to the floor. The passenger has a set of dual controls; a removable stick sits in a rack near the seat. The rudder pedals (and heel brakes back there too) are permanently installed beside the pilot's seat. There is an extra throttle on the left side of the cabin. Obviously, those controls are there mainly for emergency use. The man in the back seat is supposed to devote himself to observing, using the radio, and doing photographic work.

The instrument panel layout is satisfactory with one exception: the mixture-control knob is uncomfortably close to the carburetor-heat knob. And, as always seems to be true with this particular kind of oversight, both knobs are identical in size and appearance. It would be dangerously simple to pull out the wrong knob just as you enter the traffic pattern. Accident reports based on that one oversight continue to come in regularly.

As I've said, this airplane should be an excellent workhorse. The rear end can be loaded full, either through the single right-side front door or through the two large rear windows. The farmer or rancher would find this an excellent means of dropping salt cakes or even feed to inaccessible herds. And powerline or pipeline patrol pilots could easily inspect and photograph from this airplane.

The Air Force competition for which the *Observer* originally was designed has not yet been concluded. Luscombe, of course, has high hopes of getting a substantial contract—and from what little I know about military liaison-plane requirements, I would say the *Observer* should be a strong contender for the contract. Meanwhile, Luscombe also hopes to write off a bit of the engineering costs by selling *Observers* for $3,195 each, at the factory. Which isn't too bad when you consider that, in addition to the customary required instruments and controls, you get a starter, generator, panel, navigation and landing lights and a cabin heater. END

Curse of the Jenny

(Continued from page 23)

monoplane built by Bellanca carried four passengers and a pilot at 95 m.p.h. on a 95-h.p. Anzani air-cooled engine. The 1928 Cessna high-wing monoplane carried four passengers at a maximum speed of 150 m.p.h. powered with a 230-h.p. Wright *Whirlwind* engine.

A side-by-side high-wing *Monocoupe* of the same year had a 60-h.p. engine with a top speed of 102 m.p.h. and a landing speed of 35 m.p.h. "Equipped with a 1947 engine, the 1928 *Monocoupe* would be improved in reliability but little in performance and virtually none in over-all utility," a footnote adds.

"Moreover it was priced at $2,675, which means that with minor refinements the model might be competitive with many airplanes in today's market."

The major increase in personal plane performance since the 1928 Cessna was the result of the NACA cowl, introduced in the early 1930's. By improved cooling and reduced drag, it permitted a refined version of the 1928 Cessna, appearing in 1934, to carry four passengers at a reported 162 m.p.h. using only 145 h.p.

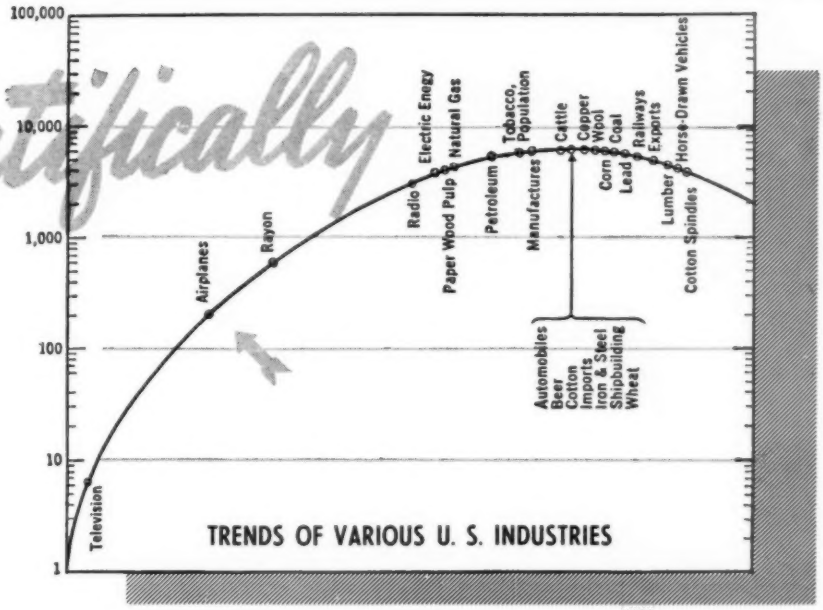
"Although present-day cabin monoplanes offer some improvements in comfort, economy, and ease of operation, none offers appreciably better performance with comparable horsepower," the report says.

One trouble with the later high-performing four- and five-place planes of the 1930's, such as the Spartan *Executive* and the Beechcraft Model 17 was their high cost. The market was limited to a few hundred planes a year which was insufficient to make sales volume an im-

HOW TO CHOOSE A CAREER

Scientifically

In their famous book, "Cycles," Edward R. Dewey and Edwin F. Dakin (Henry Holt and Company, 1947) explain the "key to predicting what may come by examining what has been."



YOUR FUTURE IS TOO IMPORTANT TO MAKE A WRONG CHOICE. Study the chart above. Note the position of aviation. Is there any better way of getting into a new and uncrowded field than to choose a *growing industry?* Choose your career scientifically. Select an industry with a bright future. Then get the training to fit you for success on the job.

Spartan, *the University of Aviation,* trains men and women thoroughly for well-paid jobs in aviation. Spartan courses are CAA approved. They are geared to the industry. Here, you train on "live" aircraft, the same type of equipment you will work with after graduation. *You will not need more than Spartan training — you cannot afford to take less.*

Spartan will soon publish a series of "Aviation Career Studies." Write, asking to have copies reserved for you.

SPARTAN
A UNIVERSITY OF AVIATION
SCHOOL of AERONAUTICS — MAXWELL W. BALFOUR, DIRECTOR
COLLEGE of ENGINEERING — ADDRESS DEPT. F-98
TULSA, OKLAHOMA

If you are not satisfied with your present earnings and place in life; if you want to be an important part of a great and growing industry — an industry that is just now entering a greatly expanded phase of development — tie your future to aviation.

Delay means lost opportunity. Get started right away! Take that important step by writing for our new, 40-page catalog that gives complete information on job opportunities and training requirements. Do it now!

1928 **20th Anniversary** 1948

APPROVED FOR VETERANS

Maxwell W. Balfour, Director
Spartan School of Aeronautics Dept. F-98
Tulsa, Oklahoma

Please send your free Catalog immediately.

Name_____ Age____

Address_____

City_____ State____

Indicate which of these branches interests you:

- ☐ Flight
- ☐ Instruments
- ☐ Mechanics
- ☐ Aeronautical Engineering
- ☐ Radio
- ☐ Airline Maintenance Engineering
- ☐ Meteorology
- ☐ Management and Operations

Spartan is approved for training under the G. I. Bill of Rights

portant source of revenue to fixed-base operators.

The basic weakness of personal flying today goes directly back to the kind of flying and ideas of airplanes that began with the *Jenny* after World War I.

The most important requirement of an airplane is usefulness. The study compares the use of airplanes in the east, where distances are short and terrain and weather are difficult, with comparable use in many parts of the west.

One experienced strategically-located eastern operator, in a community with thousands of two-car families, concluded that he should be able to sell at least 100 personal planes a year to this market. He made a substantial investment, and obtained a distributorship.

"By exerting a strenuous and costly sales effort, he was finally able to sell 24 new airplanes during 1946. By the first quarter of 1947 his sales of new aircraft had not only ceased entirely, but his business was further embarrassed by the fact that about half the individuals who had purchased airplanes from him during the previous year by then wished to dispose of them."

By contrast, an operator of a similar size company near a large western city sold over 20 planes in 1946. His rate of sales had declined in 1947 but he was still selling new planes. Furthermore, only a few of the planes he had sold in 1946 were known to be available for resale and some of these were to permit their owners to buy four-passenger models.

"The major complaint among the dissatisfied owners at the eastern city was that their airplanes cost too much to own and operate," the report states. "By contrast, however, the relatively satisfied owners at the western city were actually spending more per month since they were using their airplanes more often. The experience in numerous other parts of the country also bears out strongly the important conclusion that is indicated here. That is, *objections about the high cost of personal aircraft are usually not objections about the costs as such, but are really objections to the high costs in relation to the negligible use of the vehicle.*"

Bollinger and Tully found that accidents and fear of flying unquestionably curtail aircraft sales in all parts of the country, but where the airplane has real utility an increasing number of people are flying despite accidents. While the high cost and high accident record of personal airplanes are unquestionably serious sales impediments in all parts of the country, *the most basic and controlling factor is the usefulness of the vehicle.*

The authors believe that only if a substantially improved vehicle can be developed in the near future will the majority of companies now in business have a reasonable opportunity for sound progress.

The helicopter is not highly developed enough at present. Today helicopters are complicated, expensive, and difficult to operate. They are a long way from widespread personal use. If the flying automobile's problems of undue cost and possible operational hazards can be solved, it may have enough utility to appeal to a respectable market.

But neither of these are here today. The question then is, can the conventional airplane be improved and modified sufficiently to permit practical attainment of more of its inherent utility?

High lift flaps, together with wing slots, could decrease the area needed to land and take off but U. S. manufacturers have come to regard such developments as impractical from a standpoint of immediate profits. One manufacturer said that even if he did put high lift devices on the wing, to cut the landing area requirement in half, the plane's users would probably still be forced to use the same airports as do all other aircraft.

Again, the *Jenny* is at the root of the trouble.

"If the country's airport pattern had not become so rigidly frozen to outlying fields requiring substantial acreage, personal aircraft manufacturers would perhaps long ago have developed models which could use a fraction of the present required landing area," Bollinger-Tully conclude.

"The industry appears to have greater need and opportunity for progress through placing more emphasis on the vehicle's capacity to use safely (and quietly) a much smaller landing area instead of concentrating upon the two more common objectives of attempting either to make the airplane capable of greater speed between the existing type of airports or else attempting simply to make the old style of vehicle cheaper without changing its basic characteristics."

They believe that sufficient advances to permit the production of a substantially improved plane appear to have been mechanically and aeronautically feasible for some years. "A number of aeronautical scientists . . . had indicated that they do not understand why more progress along these lines has not long since been made by the personal aircraft industry. In view of the apparent need and opportunity, the facts seem paradoxical. Only when the overpowering effect of war influences and the consequent roles of Federal actions are understood do the reasons for the industry's present dilemma become clear."

CAA regulations have added to the problem by freezing personal flying regulations along the pattern set by the Jenny *and by military aviation requirements.*

Many fixed-base and flying school operators object to prolonged practice of turns-around-pylons at low altitude, simulated forced landings, and the fact that students are required to spend too much time in attaining temporary precision in maneuvers practiced in the vicinity of the airport.

The CAA, in fact, has had a statutory responsibility to promote civil flying in the interests of national defense. The fact that civilian flying has in many ways been forced to follow an essentially military pattern has discouraged many prospective customers.

The requirement of a tail spin is a case in point. "In the days of the *Jenny*, spin

KOLLSMAN
INSTRUMENTS
FOR
PRECISION FLIGHT
With good instruments, a pilot is never actually "flying blind." He can face the most adverse conditions of visibility with confidence.
Ever since the first "blind flight," the rugged accuracy of Kollsman precision instruments has made them standard equipment on practically all commercial and military aircraft. In choosing Kollsman Scout instruments — designed and built to the less exacting requirements of lighter planes — the private owner may avail himself of Kollsman quality instrumentation at very reasonable cost.
Look for the name of Kollsman on your instruments the next time you buy.
KOLLSMAN AIRCRAFT INSTRUMENTS
PRODUCT OF
SQUARE D COMPANY
ELMHURST, NEW YORK
GLENDALE, CALIFORNIA

practice was important because an accidental tailspin could result from minor mishandling of the controls. Long after manufacturers were able to build airplanes that could scarcely be forced into a spin, they continued nevertheless to build models that would spin very easily. . . . This design 'weakness' has been purposely continued because ease of entry into a tailspin has been required for training purposes."

Here we have a vicious circle of spin practice being required because planes do spin, and the manufacturers building them to spin because spin practice is required.

Recently the CAA has attempted to encourage the development and operation of spin-resistant airplanes—yet the more important and controlling influence of Governmental action (the GI training program) has continued to require this obsolete and dangerous feature.

Bollinger and Tully have found that Governmental regulatory procedure evidently interferes with technological development.

Many Governmental regulations are praiseworthy individually, but in the aggregate they have impeded progress. "Although the CAA has on the one hand been making a determined effort to obtain a larger number of the greatly needed small landing areas, the cumulative effect of Governmental regulations and control at both the Federal and local levels seems to be working strongly in the opposite direction."

Many operators have asked whether the automotive industry could have developed satisfactorily under the degree of well-meant but nevertheless repressive controls that surround personal aviation.

Nevertheless, Bollinger and Tully see two stable factors in the market. First is the fact that lightplanes are becoming a practical means of transportation in the farm, ranch and mountain areas west of the Mississippi River. This is developing a small but apparently continuing demand in the less-populated sections of the country. The second source of market strength is the growing use of several of the new four-passenger models which are better designed and equipped for cross-country flying. In addition to the demand for ranch use, an appreciable number of wealthy individuals and corporation executives are acquiring these planes for personal transportation. This demand is still small and highly selective. At the end of 1947 the demand for four-place types had temporarily stabilized at a rate equivalent to annual sales of about 6,000.

"For the fixed-base industry to be prosperous at its current size without Government-subsidized training would, it is estimated, call for an annual sales volume of between 40,000 and 60,000 aircraft. An annual volume of around 30,000 should permit the majority of companies to stay in business although at a sharply reduced scale of activity.

"On the other hand, an annual volume much under this level (which is still well above the 1947 level of 16,000) will probably find the aircraft sales-service business encountering real hardship without the support of Government-subsidized flight training."

MAKING FLYING SAFER

GEORGE T. PEW Equips His Beech Bonanza With IRVIN "Chair Chutes"

Executives like George T. Pew of the Sun Oil Company know that modern safety devices greatly increase flying safety. They know that it is poor policy to take chances when reasonable means are available for reducing or eliminating a risk. That's why George T. Pew and so many other business and professional men are installing IRVIN "Chair Chutes" in their personal and company owned planes. They want *every* possible protection.

Photographed at Wings Field, Ambler, Pa.

George T. Pew of the Sun Oil Company in his Beech Bonanza. IRVIN "Chair Chute" can be seen fitted into the back of the unoccupied seat. It is upholstered to match the rest of the chair...is not worn ordinarily, but is instantly available in an emergency. Circular describing the installation and use of this Air Chute* is available on request.

FEEL SAFER ...BE SAFER with Irvin Custom-Built "Chair Chutes"

IRVIN Air Chute The Life Preserver of the Air

There are now over 35,000 registered members of the Caterpillar Club. Should you qualify, please write us.

*Reg. U. S. Pat. Off. Copyright 1948

IRVING AIR CHUTE CO.

INCORPORATED

1672 JEFFERSON AVENUE

BUFFALO 8, NEW YORK

Pacific Coast Branch: 1500 Flower St., Glendale 1, Calif.

As new and slick as the *super sonic* Skystreak, is this Air Force approved horse hide leather flight jacket of the same name. The Skystreak has warm, lightweight Alpaca lining, proven by cold weather operations as the best body insulator . . . extra large fur collar. Large map pocket. Size 36 to 48. About $35.00.

If your favorite store or dealer does not carry the Skystreak, write direct to

UNITED AERO-WEAR DIVISION

United Garment MANUFACTURING CO.

MINNEAPOLIS 1, MINNESOTA

INVENTORS

When you are satisfied that you have invented a matter of value write me, without obligation, for full information on what steps you should take to secure a Patent.

PATRICK D. BEAVERS

(Formerly RANDOLPH & BEAVERS)

Registered Patent Attorney

913 Columbian Building, Washington 1, D. C.

INDIANA TECHNICAL COLLEGE

ENGINEERING. B.S. DEGREE IN 27 MONTHS. Aeronautical, Chemical, Civil, Electrical, Mechanical and Radio Engineering (inc. television). Drafting. 1-yr. Gov't approved for G.I.'s. Low rate. Earn board. Large industrial center. Students from 48 states, 18 countries. Demand for graduates. Enter Sept., Dec., March, June. Write for catalog.

129 E. Washington Blvd. Fort Wayne 2, Indiana

Yours 1/2 PRICE! WHILE SUPPLY LASTS

THIS 12-VOLUME ILLUSTRATED

LIBRARY OF AERONAUTICS

Practical Instruction in Designing, Constructing, Servicing and Flying ALL Modern Aircraft!

Learn to be an Aviation expert—qualify for high-pay and rapid promotion! This great library gives you simple, authoritative, step-by-step instruction in ALL major branches of aeronautics, by more than 20 world famous flyers, technicians, heads of university engineering departments, industry leaders, etc.—men like Dr. Alexander Klemin, Lt. Col. Harold Hartney, Thoburn C. Lyon, Prof. Frank N. M. Brown, Capt. Holden C. Richardson, Nils Henrik Randers-Pehrson, Lieut. Myron C. Eddy, H. L. Bender, Martin Barzeley, Prof. Benjamin Ruffner, and many others! It would cost you hundreds of dollars to secure instruction in any residence school from such authorities. A single course by one of these experts would cost more than the bargain price of this entire set! See this great aviation library without obligation!

FREE WEEK'S TRIAL!

2000 Pages • 2200 Illustrations!

The vast scope of the library is indicated by the following titles: Flying Boats; Aerial Navigation; Handbook of Airplane Maintenance and Operation; Aircraft and Power Plant Accessory Equipment; The Complete Flying Manual; Elements of Technical Aeronautics; History of Aviation; Flight Instruments; Radio in Airmanship; Diesel Aviation Engines; Flying by Instruments; Superchargers for Aviation.

2200 photos, drawings, diagrams, maps, tables.

Complete directory of more than 1800 airports. Specimen Sectional Coast Guard Topographic Chart in 5 Colors. Glossary of Aviation Radio Service Terms. 2 Indexes for quick reference. Thousands of these sets originally sold in aircraft binding for $37.00; a wonderful buy in handsome cloth-binding for only $17.80—on easy terms!

National Aeronautics Council, Inc.
37 W. 47th St., New York 19, N. Y.

MAIL THIS FREE-TRIAL COUPON →

National Aeronautics Council, Inc.
37 W. 47th Street, New York 19, N. Y

Send me immediately postpaid, for free examination, the 12-volume "LIBRARY OF AERONAUTICS." After a week, I will either return set and owe nothing, or keep it and send initial payment of only $2, and $2 a month until the bargain price of only $17.80, plus a few cents postage, is paid. (Cash with order price $17.00, postage free.)

DO NOT WRITE IN BOXES
134
209

Name .....

Address .....

City & Zone ..... State .....

SAVE MORE. Send $2 initial payment now and we will stand shipping charges on this 15 lb set. Immediate refund if you return the books.

Fundamental steps are necessary to make the airplane more useful.

First is the need to erase the deeply ingrained fallacy that personal planes can be operated only from large outlying land areas. More than a change in CAA regulations is necessary. The public must be educated to the need. Of particular value would be a completely new, modernized set of standards for the airplane, its use, and its landing area requirements—such as to make the close-in "good neighbor" airpark more acceptable.

Second, if, as military testimony indicates, personal flying need no longer be considered a prime adjunct of the military establishment, then perhaps the operator himself might reasonably expect more freedom from the past multiplicity of orders and rigidity of controls.

Third, and most basic, is a better airplane that can offer the customer more safety, utility and economy.

"In summation, freedom from rigid controls and the foregoing of public subsidies may as a practical matter be almost inseparable goals. Elimination of both promises to be no easy matter, but may be essential if a strong industry is to develop. If the business can be freed of these restrictions originally evolved to fit the 1918 *Jenny* and its immediate successors, individual initiative may have a more adequate opportunity to convert the industry to a sound self-supporting basis."

It is vital that the maximum number of fixed-base companies be preserved in a healthy condition while the personal aircraft industry as a whole finds a solution to its present dilemma. The bulk of the Bollinger-Tully report is devoted to observations specifically designed to aid those concerned with the sound management and preservation of individual fixed-base units. END

Search for Lost Pilot

(*Continued from page 29*)

Tuesday evening, almost 48 hours after his take-off from Rochester, we decided to go there ourselves and operate an on-the-scene search. Wednesday morning before dawn, my husband, who was with a Search and Rescue Unit of the AAF in India during the war, and I flew a rented airplane from Chicago to Cleveland. We satisfied ourselves that Dick's plane had not been there. Teletype information was ample at this time although it had not appeared until late Tuesday morning.

Dick, if he had survived the crash, had been down almost 60 hours. Flying from Cleveland to Rochester, we searched at low altitude the entire south shore of Lake Erie but the deserted beaches revealed nothing. At Rochester we questioned everyone who had talked to Dick there. We checked weather reports available to him at the time of his take-off, and those that prevailed five hours later. Prior to his take-off reports indicated clearing weather along the lake shore, but it remained very poor for several hours longer in the whole area south of the lake. There was a surface wind of SSW at all stations reporting between Rochester and Cleveland, but a strong NW wind at all altitudes above 1,000 feet

Learn AVIATION

AN ESSENTIAL INDUSTRY IN PEACE OR WAR

Your Future

is what YOU make it... An AVIATION CAREER offers YOU a great FUTURE... If YOU are ambitious

Spectacular new aircraft, jet and rocket propulsion, gas turbine engines, sonic and super-sonic speeds together with many other new developments, demand engineering and technical training that will enable you to contribute to, and share in the new aeronautical progress.

This means new and more opportunities than ever before. It places new responsibilities squarely upon the type of training you receive. Your progress, achievement, success and advancement depend upon you and the training you receive.

At Cal-Aero Technical Institute, with its 19 years of experience, you get thorough training that safeguards your opportunity. In close liaison with major aircraft concerns, "Cal-Aero" courses are kept up-to-the-minute, and you learn in a way that the very men who employ you KNOW you should learn. Upon graduation, you will be an aviation expert and fully qualified to hold a remunerative and responsible position in today's aircraft industry . . forging ahead steadily and adding more dollars to your pay check all the rest of your life.

MAXIMUM TRAINING IN MINIMUM TIME...

with up-to-the-minute modern "live" training equipment, including helicopters, jets, rockets and wind tunnel. The courses are complete, intensive and highly concentrated, with all non-essentials eliminated.

AERONAUTICAL ENGINEERING

2-YEAR COURSE... intensive, practical training corresponding to normal progress through an engineering department. This training is kept abreast of research, development, technical and scientific advances through our special staff-arrangement with many large aircraft concerns. You learn in a way that qualifies you for success and leadership, and assures you a well paid, secure future.

MASTER AVIATION MECHANICS

1-YEAR COURSE... fully approved by CAA for Engine and Airplane License. Our individual instruction methods permit students to enter any month and secure the entire intensive course, which exceeds CAA requirements.

It prepares you for a prosperous, successful and secure future.

WE HAVE THE EXPERIENCE—THERE IS NO SUBSTITUTE FOR IT... Established in 1929, Cal-Aero Technical Institute has grown up with Aviation. It is one of the oldest and largest aeronautical schools in the world, with students in attendance from 48 states and more than a dozen overseas countries. "Cal-Aero" has more than 7,000 successful graduates in addition to 26,000 pilots and 7,500 mechanics trained for the U. S. Army, Navy and Royal Air Forces. It is located on its own famous airport, Grand Central Air Terminal, in the Hollywood-Los Angeles metropolitan area in Glendale — the Heart of Southern California's Giant Aircraft Industry. Send coupon now for full details...

Board and room are now available right here on Grand Central Airport... Transportation is no problem.

EST. 1929
CAL-AERO TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL
GLENDALE 1, Los Angeles County, CALIFORNIA

APPROVED FOR VETERANS

DON'T DELAY · MAIL TODAY

CAL-AERO TECHNICAL INSTITUTE, Grand Central Air Terminal, Glendale 1, Calif. Send full information and catalog, free and without obligation on courses checked below:

CAREER COURSES
☐ AERONAUTICAL ENGINEERING
☐ MASTER AVIATION MECHANICS

HOME STUDY COURSES
☐ AERONAUTICAL DRAFTING ☐ AIRCRAFT BLUEPRINT READING
☐ STRESS ANALYSIS AND DESIGN

NAME
ADDRESS AGE
CITY ZONE STATE
Check one: ☐ Veteran ☐ Non-Veteran

F-9

PORTABLE RUNWAY LIGHTS

APPROVED FOR AIRPORT LIGHTING UNDER C. A. A. REQUIREMENTS

$3.00 Net Each Complete

Minimum Order of 24 Lights Color Optional

- In Red, Amber, Green, Blue, Clear.
- Operates on 6 Volt Dry Battery.
- Excellent Horizontal, Vertical, Visibility.
- 60-80 Hours Intermittent Use.

Immediate Delivery

AIRCESSORIES

National Distributors

505 Roosevelt Kankakee, Ill.

SCOTT...A LEADING NAME IN AVIATION ACCESSORIES...SCOTT...A LEADING NAME IN AVIATION ACCESSORIES

SPACE SAVERS

Scott Hangar Space Savers increase storage space and simplify hangar "traffic". The original and most widely used parking device for light aircraft. Safe and easy to use. Thousands in use from coast-to-coast.

Prompt delivery from Scott distributors

OTHER SCOTT AIRPLANE NECESSITIES

Tail Wheel Assemblies
Free Air Thermometers
Brake Pressure Units — Master Cylinders
Aircraft Engine Instruments
Portable Oxygen Breathing Equipment
Gasoline Gauges — Aviation Chemicals

Established in 1932

SCOTT AVIATION CORPORATION

224 ERIE ST., LANCASTER, N. Y.

Write for FREE 1948 Accessory Folder

However, the Winds Aloft Report had probably not come in at the time of Dick's last visit to the weather station.

A talk with the Tower Operator indicated Dick's radio had been operating correctly at the time of his departure. The take-off had been on a course of 220° (southwest) and he had continued on that course until out of sight of the Tower. Dick had said while on the ground there that he intended to fly to Cleveland for refueling and then continue to Chicago. This course would take him along the shore where the weather was improving, but somehow he had become lost. With his range of 400 miles, this gave us a half circle area in which to look for him, roughly 225,000 square miles, a good part of which is occupied by Lake Erie. We were very discouraged.

We contacted a Rochester Broadcasting Station and they incorporated into two news summaries the report that an airplane of this description was missing in the area south and west of Rochester, and that a reward of $1,000 was offered by the family for information leading to the plane's location. The State Police, local police and Coast Guard all had to be informed of this offer and where to contact us in the event a report was made to them. This same information was incorporated into a telegram which we sent to every airport lying within a line drawn 100 miles south of Rochester, west to Erie, Pa., and bounded on the north by the shores of Lake Erie—some 26 wires in all.

The Army Air Sea Rescue Service had not been alerted by the CAA but became interested through a watch kept by them on Airway Communications. On Wednesday they operated B-17s from Selfridge Field, Detroit, searching Lake Erie by radar and the shores on either side visually with an 11-man crew. Two smaller Air-Sea Rescue planes, L-5s, searched the area north of Lake Erie on the chance that Dick might have tried for Detroit rather than Cleveland.

On Thursday thunderstorms at Rochester and to the west hampered aerial search. Several private airplanes joined us in searching the area close by, where return to the field was possible ahead of the approaching series of storms. Time on the ground was spent in seeking additional publicity for our search, and planning areas to be covered by individual airplanes so that our efforts would not be duplicated at the cost of leaving some other area unsurveyed.

That night the airport operator at Dunkirk, N. Y., who had received one of our telegrams, volunteered to have 10 planes in the air at dawn and fly them on an organized search all day.

Friday we were joined by the two L-5s from Selfridge Field, who had been authorized to operate out of Buffalo. The Civil Air Patrol, a semi-official group of civilian pilots, who occasionally get authorization to fly at Army expense in conjunction with searches of this nature, offered their cooperation and succeeded in getting publicity in Buffalo. Ninety-six hours had passed since we started looking for Dick, and all we knew was that he had gotten as far as Rochester.

Friday noon we received a report from one of the Dunkirk pilots who landed at Steamburg, N. Y., 60 miles south and slightly west of Buffalo. Two people there had told him they heard an airplane "flying very low" the preceding Sunday night. A restaurant manager, closing his restaurant at about 2 a.m. Monday, heard a plane flying so low that he went out to see it, but was unable to spot it in the light rain. An 11-year-old girl who had been sick that night couldn't sleep, and asked her father in the morning, "Did that plane land last night?" She lived close to the airstrip and had some knowledge of the sound of a low flying plane.

The weather was rainy and overcast that Sunday night in Steamburg and the winds might well have blown Dick off his course into this area. Logic indicated that this plane was Dick's.

On Saturday we moved our headquarters to Buffalo to achieve closer coordination between Army planes and our own. Again we contacted press and radio about the search and the reward and wired 20 more airports in an area 60 miles west and south of Steamburg. Saturday brought no news, although the B-17s were still scouring Lake Erie. Two Air-Sea Rescue L-5s and 15 civilian planes, operated entirely at individual expense and in response to the newspaper and radio pleas, searched the Steamburg area.

Sunday we moved to Jamestown, N. Y., which is 60 miles southwest of Buffalo and only 20 miles (due west) from Steamburg. The Rescue L-5s got authorization to move with us. From Jamestown and Steamburg southwest and east begin the heavily-wooded, sparsely-populated mountains of western New York and northern Pennsylvania. Dick would have found night navigation in this region very difficult.

Sunday we contacted the local radio stations, one in Warren, Pa., (30 miles south) and one in Bradford, Pa., (50 miles east) in an effort to blanket the Steamburg area with publicity. A week had passed with no tangible results.

In Monday's Jamestown and Warren newspaper we placed a full page ad in six inch type offering the reward of $1,000. Monday's weather grounded the airplanes but radio and newspaper publicity were bringing in many reports. These had to be authenticated carefully, now that our publicity was so intensive. One housewife 40 miles southwest of Jamestown reported that she had awakened one night to hear a low flying plane, but a trip by car and close questioning established the fact that it had been on a Tuesday night. A night watchman in Jamestown telephoned a report that he had heard a plane following a freight train through Jamestown about 2:30 a.m. Monday. No airplane can follow a freight train long but it might have been Dick.

Tuesday brought in reports from over 50 people who thought they had heard airplanes flying low. Each had to be investigated—either because the person wasn't sure what night he or she had heard the plane—or because, after our full-page ads, they were too certain it

had been the right night. For example, a woman had our planes scouring Lake Chautauqua (outside of Jamestown) because she reported by phone that she had definitely heard a plane crash into the lake Sunday night. Upon close investigation through personal interview, her reason for knowing it had been Sunday night was that when she had been awakened she had gone and looked at her calendar!

By noon Tuesday, we had assembled 11 members of the family at Jamestown, four of whom flew and six of whom, plus volunteers, covered the areas by car investigating reports and seeking new information. The Air Sea Rescue had three L-5s based at Jamestown. We had three planes, and, in addition, five experienced airport operators in a 30-mile radius of Jamestown were hired to fly over the part of the country most familiar to them. All flights had to be planned and coordinated. The ground parties also required organization. And their phoned-back information had to be recorded and disseminated. One member of the family sat by a phone at the airport and served as "intelligence headquarters" for all plans and reports. Authenticated ground reports had now established a fairly definite indication of our lost plane flying between Steamburg, Jamestown and Warren. As most reports came after our extensive radio and newspaper publicity had blanketed the area, we accordingly inaugurated a similarly intensive campaign in the area from Jamestown 80 miles west.

About 11 p.m. Tuesday we received a call from Endeavor, Pa., (about 50 miles south of Jamestown) where a man reported his wife had awakened him on the Sunday night in question, saying that she had heard a plane crash on the wooded hills behind their house Eoth husband and wife had gone to their back porch, but had seen and heard nothing. Several days later the husband told a neighbor about his wife's dream, and the neighbor said, "Golly, my wife woke me up that night too, thinking she heard a crash." They telephoned in the report after seeing our advertisement in the Warren newspaper.

This information seemed so conclusive, even over the phone, that a ground party left Jamestown at 3:30 a.m. to be in Endeavor at dawn to interview the witnesses. Planes were alerted for a dawn take-off. The ground party reported back that the first two witnesses were reliable, and a third had been found. The planes were dispatched.

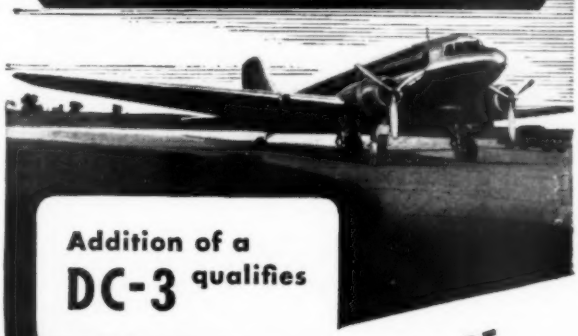
The 10 members of our ground party started climbing the suspected hills behind the witnesses' house and found the woods so thick that they could not see over 50 feet. Immediately they called for more volunteers. An additional reward to anyone finding the wreckage that day was broadcast on the Warren radio. Local men, women and children, sheriffs, game wardens, forestry service officials and fire patrols all joined the search.

Four airplanes flew over an area four miles by six miles until 12 noon, but nothing was found. About 1 p.m. one of the family planes spotted the wreckage, about 600 yards from the house, but on a hill *in front of* rather than behind the house. Due to the density of the woods, the ground party's position on the wrong hills, and the search plane having to leave for refueling, it was 4 p.m. before the wreckage was reached on the ground. Other planes in the vicinity could not locate the wreck, until the first pilot returned and circled it in order to lead the ground searchers through the woods to the exact spot by sight and sound. Our lost pilot was found still seated at what was left of the controls. Death had apparently been instantaneous.

The house from which this report came is on a natural gas pipeline at a pumping station which is brightly lighted all night. Apparently, Dick, after being blown off course by winds, and flying over poorly-lit country for several hours, had felt that this brightly lighted place might be an airport, or at least worth investigating. In letting down either to identify or to land, he had flown into the hillside. His directional gyro was frozen on an east heading and the plane went into the trees headed east, indicating a turn from his previous course. The clock was smashed at 3:30, a reasonable elapse of time since take-off, when it is considered that he had done a substantial amount of circling in an effort to identify some landmark or locate a clearing. Only about 30 minutes of fuel would have remained.

We estimate that 30 plane-hours had been flown over this small valley before the wreck was found. In such densely wooded, ruggedly hilly terrain, it might never have been located had we not been able to narrow our search after reports from witnesses. They would never have known there was a plane lost in that area without our local publicity—

Another BIG STEP in PRACTICAL TRAINING



Addition of a DC-3 qualifies

CURREY SCHOOL OF AERONAUTICS to give

Multi-Engine Commercial and C.A.A. Instrument Ratings...

FULL C.A.A. Requirements for Airline Operations

Yes, something new has been added! In addition to 74 regular aircraft and a helicopter, Currey now has this great DC-3. As a result, the school is qualified to give multi-engine commercial and C.A.A. instrument ratings . . . full C.A.A. requirements for airline operations. *Another big step in practical training for which Currey is famous!* Equally important, precision type equipment of every description is available in extensive shops and laboratories . . . supervised by experienced, certificated instructors. All facilities are more than ample for students in private and commercial flight instruction, aircraft and engine mechanics training, helicopter maintenance and operation. Located in a beautiful, clean, small city where living conditions and social surroundings are ideal, Currey School of Aeronautics offers *everything.* All courses approved by Illinois State Department of Education for training Veterans under G.I. Bill. You are cordially invited to inspect both school and city.

New classes start every five weeks.

HELICOPTER MAINTENANCE AND OPERATIONS COURSE

For those students who desire the most advanced field of aviation. A course for helicopter pilots or for those who wish to obtain their Aircraft or Engine Certificate, with specialization in helicopter maintenance. Refresher course and complete flight training is available in Bell Helicopters.

MAIL COUPON TODAY

CURREY SCHOOL OF AERONAUTICS
(Division of Currey Flying Service)
MUNICIPAL AIRPORT—GALESBURG, ILL.

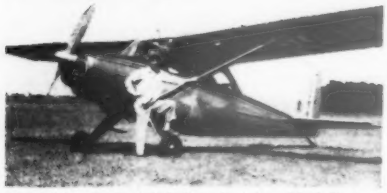
Without cost or obligation, please send me complete information on your school and the various courses offered.

Name.....Age.....

Address.....

City.....State.....

THE 1949 Silvaire
SEDAN



COMPLETELY ALL-METAL
The World's Most Luxurious 4-Place Personal Plane

"LOUNGE CAR" COMFORT!

The ultimate in furnishings and appointments to give you luxurious comfort. Spacious cabin with generous leg and head room permits "four-way" stretch . . . Soft foam rubber seats . . . Rich finishing of instrument panel . . . Deep pile carpeting . . . Fiber glass sound-proofing . . . and many other "firsts."

"NEW LOOK" IN PLANES!

A NEW Postwar airplane from nose to tail. The all-metal high-wing and over-all graceful lines are accentuated by a metalic finish bronze striping. 3,716 sq. in. of window area for greater visibility and added eye-appeal.

WRITE TODAY FOR DETAILS

LUSCOMBE AIRPLANE CORP., Dept. 94
Box 2128, Dallas 1, Texas

Send complete details on the 1949 Silvaire Sedan.

NAME _____
ADDRESS _____
CITY _____ ZONE ___ STATE _____
AGE _____ OCCUPATION _____

ONE STEP in the right direction and you're in comfortable, cheerful Hotel Cleveland. Convenient to stores, Public Auditorium, Stadium, theatres. Directly connected by covered passage to Union Passenger Terminal, garage, Terminal office buildings.

HOTEL CLEVELAND
Cleveland, Ohio

in particular the full page advertisement offering the reward. Another time or place it might be the radio publicity or the telegrams to airports that would reach the person who could find the plane.

What happened? First of all, Dick was in a hurry to get home where he had a responsible post to fill Monday morning. Second, he was undoubtedly very tired, having flown East for a weekend and started to return two days later. Third, he had been fighting marginal weather conditions for a three-hour flight in the afternoon. He exercised caution and judgment in delaying his trip for five hours in Rochester, while he waited for an improvement in the weather.

Alone and lost at night, one person is too busy flying the airplane to do much with a map, and with no Airway beacons to identify his position, the map shows very little. If any light is used to read the map, night vision is definitely impaired for several minutes. With the poor weather conditions in this region, it is unlikely that much horizon was visible so that attention could not safely be long distracted from the gyro horizon. Even if Dick swung his radio dial and tuned in a new station quite strongly, where was the time to identify the code signals and examine the map? He was not an instrument pilot; he might have read a book on procedure, but he had no publication with him which would tell him procedure for the particular range involved, and he had no time to read it if he had. None of us have hands enough or luck enough to get through serious trouble alone at night. END

Strategy Against Soviets

(*Continued from page* 18)

The B-50 will soon become operational. It carries a heavier bomb-load and has about a 6,000-mile range. It is probably a fairly good guess that the improved B-29 and B-50 would have operational radii of not over 2,250 miles. In addition, there are other obsolescent wartime bombers which could be modified for shorter ranges, including the Douglas B-26 and North American B-25.

These conventional figures on ranges, however, no longer mean as much as formerly. Aerial refueling might step up normal ranges by another 50 per cent. Air Force officials are reluctant to talk about any specific figures, but it is no secret that aerial refueling is being developed for strategic uses.

Considering maximum radii as 2,500, 3,000, and 3,500 miles, what Soviet targets could our Air Force bomb?

From the celebrated arctic bases, about which we have heard so much, practically none!

The geographers have told us that a future war will be fought in the air above the frozen arctic. That war is still in the future. From the northern rim of North America at Pt. Barrow to the northern rim of Europe is over 3,000 miles. The distance is practically the same from Boothia Peninsula, in northern Canada, across the North Pole to the nearest Asiatic coast. And there are hardly more strategic targets on the northern rim of Asia than on the northern rim of North America.

The truth is that the great arctic coastline of North America, besides being an extremely difficult place to operate, is far removed from the industrial areas of the U.S.S.R. and our bombers would be stretching to try and cover the distance.

But why fly from the arctic? When we bombed Germany we didn't bomb from the U. S. When we bombed Japan, we didn't send planes from Hawaii. Let's face the realities. We would have to have allies or seize the bases we would need.

From a strategic bombardment viewpoint, there are four key industrial areas in the U.S.S.R. There are the Donetz Basin, and other areas in Russia proper west of the Urals; the Ural industrial area; the Kuznetsk Basin in Siberia, and the Far Eastern area. Add to these the critically important Baku oil fields. All can be hit from bases much closer and better than the United States.

From Reykjavik in Iceland to Moscow is 2,100 miles. From Spitzbergen it is 1,600. Since our Navy could dominate the oceans, we probably could establish and maintain bases on these islands no matter what the Russians did, and despite their land-based aircraft. Now let's come in a little closer. From Hammerfest in northern Norway the distance shortens to 1,150 miles, from Stockholm to 800. No wonder the Russians are interested in Scandinavia. England, too, could provide a base just as it did in World War II.

There are other avenues of approach to Soviet industry. One is through the Near East. From Greece or Turkey, not only the heart of Russia proper but of the Ural industrial area is vulnerable. From Northern Turkey to Kharkov is only 550 miles, to Moscow 900, to the Urals 1,400 to 1,500. From Athens it is an additional 500 miles or so to these key cities.

Still another series of bases might be used temporarily, at least. These are in Iraq, Iran, and northern India. It is only 300 miles from Tehran, Iran, to the great Russian oil center of Baku, only 1,300 to Magnitogorsk and 1,600 to Sverdlovsk in the Urals. It is 1,500 to the Karaganda coal mines, and 1,800 to 2,000 to the Kuznetsk Basin cities of Novosibirsk, Semipalatinsk and others. The distances from Baghdad to these cities varies from 600 miles to 2,400 miles. From Srinagar, in northern India, it is 1,050 (to Karaganda) to 1,650 (to Sverdlovsk).

The Soviet Far East is within easy reach of bombers based on Japan. From Tokyo it is only 900 miles to Khabarovsk and 600 to Vladivostok. From bases on Hokkaido it is only 500 and 400 respectively.

All these calculations must allow for the fact that the U.S.S.R. is by far the greatest land power in the world today, with the most powerful army.

In a long war, Scandinavia could not be held against that army unless we reinforced the Norwegians and Swedes

promptly and heavily with ground troops, aviation and supplies. In a show-down, the Soviets would promptly overrun all of Germany, France, and Italy. On the other hand, our powerful Navy could secure Iceland and maybe Spitzbergen.

In the Near East, it seems unlikely that Greece or the Dardanelles could be held for long. Eventually Russian ground troops could occupy Turkey.

While Tehran could not be held, the Persian Gulf coast might be. It is farther from Russia, the terrain is difficult and it is closer to the shipping and oil needed to defend it. Bases in India might be valuable but the key targets are in Europe and can be reached easier from other bases. Japan could certainly be held, but again the Far East, though important, is not decisive.

The crux of this argument is that we do not today have bombers capable of implementing polar strategy. But even if we did, it would be far better to deliver gasoline by ocean tanker to close-in bases than to waste bomb capacity carrying it in airplanes from distant bases. Though only propeller-driven bombers are available at present, close-in bases would permit the use of jet bombers in the near future. They would be much better able to cope with the fast Soviet fighters. It is a fair conclusion that if reasonably close bases could be maintained to hit European Russia and the Ural combines, most of Soviet strategic industry could be paralyzed. END

Air Power

(*Continued from page* 15)

by the Strategic Air Command in the accomplishment of its mission are the B-29 bomber and the F-51 (being replaced by jets), the F-80 and the F-84 (jet fighters). Although replacement of the B-29 by the 6,000 mile B-50 will soon begin, improvements in the wartime model have increased its range to where now it can carry 10,000 pounds of bombs for 4,600 miles. This range, which permits the B-29 to climb to bombing altitudes and attack targets under combat conditions over 1,800 miles away, brings much of the industrial world within striking distance of our existing bases. The employment of tanker aircraft to refuel the B-29's in-flight will substantially increase the number of targets which could be reached if the United States were forced to retaliate against aggression.

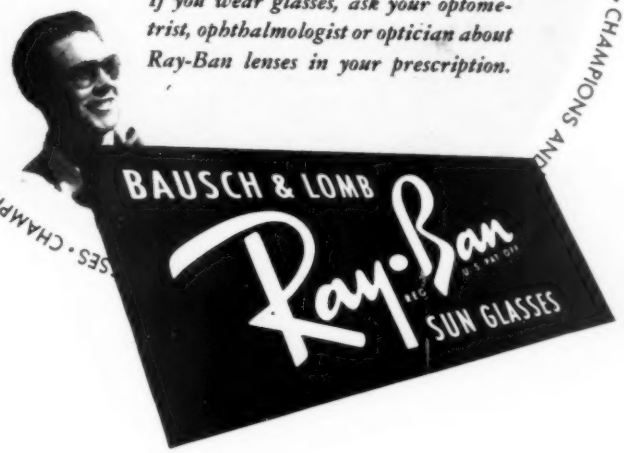
In the near future six Strategic Air Command groups will each be equipped with three B-29 bombardment squadrons and one B-29 tanker squadron. The use of this refueling technique was foreshadowed nearly 20 years ago when Gen. Carl Spaatz, then a major, flying a Fokker C2-3, set a world's endurance record of 150 hr. 40 min. 15 sec. by taking on gasoline in flight. It is interesting to note that two of General Spaatz's companions on that historic flight were Capt. Ira C. Eaker, who recently retired as a lieutenant general after serving in a number of very important World War II positions, and Lieut. Elwood R. Quesada, now a

CHAMPIONS AND LEADERS WEAR RAY-BAN SUN GLASSES • CHAMPIONS AND LEADERS WEAR RAY-BAN SUN GLASSES • CHAMPIONS AND

Cool Comfort in Sun Glare... for Your Eyes

Be sure that hours in the sun are pleasant hours. Give your eyes the safe, scientific protection of genuine Ray-Ban Sun Glasses. They filter out glare and give clear vision with cool comfort to your eyes. Write for descriptive folder. Bausch & Lomb Optical Co., Rochester 2, N. Y.

If you wear glasses, ask your optometrist, ophthalmologist or optician about Ray-Ban lenses in your prescription.



P & W PARTS FOR SALE

A $25,000,000 INVENTORY

Priced 35% off Govt. Cost

AIR-PARTS INC.

• 723 SONORA AVE., DEPT. F, GLENDALE 1, CALIFORNIA

SKYTOURS AIR RESORTS

offers aircraft owners and Sportsman pilots pleasure flights to interesting . . . . . .

FLY-IN

air resorts, of exceptional distinction, a

SKYTOURS' LISTING

of places unique in every respect. Scenic exceptions—diversified sports—modernistic lodgings—complete ground facilities—rates consistent with Skytours standards. This service is . . . . . .

NATIONAL IN SCOPE

and sent to plane owners only, at no cost, as an inducement to patronize vacation spots where the private flyer is king. Write for this free list with complete details on other Skytours advantages. Be sure to include type of plane you own. Write . . . . .

SKYTOURS, INC.
Box 120—SWARTHMORE, PA.

Be a PILOT!
GET Thorough Individual Instruction
It will pay you well to learn aviation "from the ground up," at an old established flying school where expert instructors, personal attention and an aggressive, thorough program can prepare you for an aviation career in the shortest possible time.
GOVERNMENT APPROVED
CAA APPROVED
Students from all over the nation and many parts of the world are getting their private, commercial, instrument and multi-engine ratings NOW! at the Gottschalk School. Veterans' tuition paid by the Government under G.I. Bill. To others, there are opportunities for work to cover living expenses or tuition. Write today.
GOTTSCHALK
School of Aeronautics
ADRIAN, 2, MICHIGAN
APPROVED FOR VETERANS UNDER G.I. BILL

AERO PUBLISHERS INC

AIRCRAFT
WEIGHT, BALANCE & LOADING
By Charles Edward Chapel
Consultant for Northrop Aeronautical Institute

- Brand new book. First aviation volume ever published that covers WEIGHT & BALANCE and **also** the basic facts of **Airplane Loading.**
- Typical problems and check questions added, with 70 charts and sketches in C-O-L-O-R.
- Written to meet the needs of: Students, Pilots, Mechanics, Flight Crews and Ground Crews.

$3.25 Postpaid or C.O.D.
Write for 1948 Catalogues and Price Lists
AERO PUBLISHERS, INC.
2162 (1) Sunset Blvd. Los Angeles 26, Calif.

lieutenant general and commander of the Tactical Air Command.

Although it is essential that the United States have adequate defensive air power to minimize the effectiveness of a possible enemy air attack, it is the long range striking force that must, in the main, be relied upon to achieve supremacy in the air and victory in war. The President's Air Policy Commission recognized this fact when it stated in its report, *Survival in the Air Age*, that ". . . no plans for defense should be made in derogation of the striking counter offensive air arm in being." The truth of this statement stems from the fact that a determined air attack is a very difficult thing to turn back completely in the limited time available to the defender. A few attackers are almost certain to break through the defense, no matter how efficient, and drop bombs on this target. With the possibility that any of the major powers in the foreseeable future may possess the atomic bomb in usable quantities, the recognition of this fact is of the utmost importance.

The ability to hit back—harder, more accurately, and more often—is essential, considering the capabilities of the air weapons of today to avert defeat and gain the victory. The targets of such retaliatory attacks comprise the vital spots in the enemy's war machine: his oil refineries, his electrical power system, his steel and aluminum industry, his engine, armament and air-frame factories, and perhaps his atomic bomb plants.

The task of undertaking such operations if war comes again would, in large part, belong to the Strategic Air Command. The United States citizen, then, when looking over the vast establishment that is his Air Force, can reflect that a substantial part of the training, research and development, planning, procurement, construction, maintenance, and administration that makes up the total activity of the Air Force is directed toward making one of the major war divisions of the Air Force, the Strategic Air Command, a more effective instrument for guaranteeing his security and maintaining the peace of the world. END

Arctic Air Force

(*Continued from page* 21)

blower to defrost the pilot's windshield and canopy. Synthetic rubber, which becomes brittle in winter weather, has been replaced throughout the winterized F-80Bs with natural rubber, particularly in the sealing of the pressurized cabin. A special cold-weather grease is also used because the throttle would be too stiff in sub-zero weather.

Preceding the jet jobs into the Arctic, conventional type aircraft suffered the first mechanical headaches. Even the best planes had to be grounded as soon as their engines cooled after landing. Troubles included congealed oil, stiff rubber parts, cracked plastics, frozen grease, and hydraulic fluid flowing through ruined seals.

Engineers developed the "Yellow Dot" project which evolved new improvements for aircraft operating at temperatures from —65° to 160° above. Following extensive cold-weather laboratory tests, okayed parts were given a yellow dot denoting acceptance. The "hot-wing" for de-icing and "electric glove" for propellers were additional developments.

Cold weather continues to affect aluminum parts. They get brittle and fail unexpectedly. Radar has been disrupted as a result of the cold on metals. However, many of these mechanical problems have been solved or are near solution and the USAF is confident that it can fly anywhere, any time in the big ice box on top of the earth. The chief concern now is survival in the event of an Arctic crash.

Realizing the need for thorough indoctrination of flying personnel in survival methods, the Alaskan Air Command has organized an Arctic Polar Indoctrination School based at Nome with a complement of 45 instructors. Eventually all flying personnel permanently assigned in Alaska will be graduated from the school.

The Arctic is still a formidable place for men and planes, but thanks to the work of the past few years it is not nearly as formidable as it once was. If the time ever comes that the Polar wastes are the key theater of a global war, the Air Force will know how to operate there. END

I Learned About . . .

(*Continued from page* 46)

with another fine film.

I contacted the control tower and told them where I was—and what was wrong. They told me a Lieut. James Hilton was in my vicinity. "Hold your heading and altitude till he can locate you," the tower operator said. I managed to do that—and finally Hilton drew up alongside.

I then tried to lower my gear, but found the loss of fluid prevented the mechanism from working! Using the emergency system, I asked Hilton to check to see whether the gear was fully down.

"Everything's okay," he replied.

That was one problem licked. Then, with Hilton leading the way, we flew back to the field. He told me which way to turn, and lined up my plane with the runway on a long approach. I could see the horizon—but hazily.

Unable even to lower my flaps with the emergency, I knew I'd have to land "hot." With the dead weight of one useless engine and the loss of wing area due to the inoperative flaps, there was no alternative. The next few seconds were packed with drama so far as I was concerned. But with Hilton giving directions, I got the *Lightning* down without mishap, completed my landing roll—and listened to the engine as it stalled. The pressure was zero.

We inspected the plane later, and found the oil lines hadn't been properly tightened, and had worked lose, losing oil. My gyrations hadn't helped matters.

I learned a lesson that is brief and to the point. Don't believe them when they say, "What you don't know won't hurt you." In flying, if you don't know, *find out.* In my case, I came out of the venture with bruised pride. In similar cases, the bruises are usually more severe. END

How Hard Do You Hit?

(*Continued from page 42*)

it to attain a velocity of 100 feet a minute.

You can see at once the importance of knowing this fact. A pilot, fearing the impact and feeling for the ground, pulling his nose up and down, is due for a hard landing or maybe a soft nurse. But a pilot who can steady his climb indicator (remember the lag!) at 100, 200 or even 300 feet per minute is assured of a very soft to a fair landing.

You say, "If your dope is right, then 300 feet a minute would be the same as a free drop of an inch and a half, and that sure isn't much." It isn't much, but it isn't so, either. It's equal to a free drop of $4\frac{1}{2}$ inches. That is a little jolt.

"Four and a half inches? What goes on here?" you ask in some understandable ire. All right, I'll give you the math first and then you can forget it as we all do, but I shall also give you a rule of thumb you can always use.

There are two equations that describe the acceleration of gravity. The first gives the velocity during the drop with respect to time, and is: $V = AT$, where V is the velocity in feet per second, A is the acceleration of gravity (32 feet per second), and T is the time in seconds.

The second gives the distance the object has dropped, with respect to time, and is: $S = \frac{1}{2} AT^2$, where S is the distance gone in the drop, A is the acceleration of gravity, and T is the time in seconds. Note that in these equations the distances are all measured in feet; time in seconds.

Now the *time* is bothersome and we want to eliminate it. Besides, we want to compare the distance (the height) of the drop directly with the speed of the object when it has dropped a certain distance. So we substitute and we get: $V^2 = 2AS$, where V is the velocity in feet per second, A is acceleration of gravity (32 feet per second per second), and S is the distance in feet. Note that we have a square function. You may work out test problems for yourself.

Here is the rule of thumb: Whenever we have a square function and we know the answer for one measurement we can get it for another by squaring the factor that gives the new measurement and then multiplying by the squared factor, we get the answer without doing any figure work on paper; we can do this in our heads and people not in on the trick will think that we're pretty smart.

We found that 100 feet a minute was equal to a half inch drop. Two hundred feet a minute is 2 times 100 feet a minute, which is 2 and we square 2 to get 4, and then we multiply $\frac{1}{2}$ by 4 which gives us 2, and 2 inches is the height of drop for 200 feet a minute. Three hundred feet a minute is 3 times 3, or 9 times $\frac{1}{2}$, which is $4\frac{1}{2}$ inches. Four hundred feet a minute is 16 times $\frac{1}{2}$, or 8 inches. That

AERONAUTICAL UNIVERSITY

• You will make no mistake in choosing Aviation for your future career. Tremendous opportunities are in sight—and those who are best trained will get top positions.

Prepare for your entrance into key positions in Aviation at one of the oldest recognized aeronautical schools in the country. Courses in:

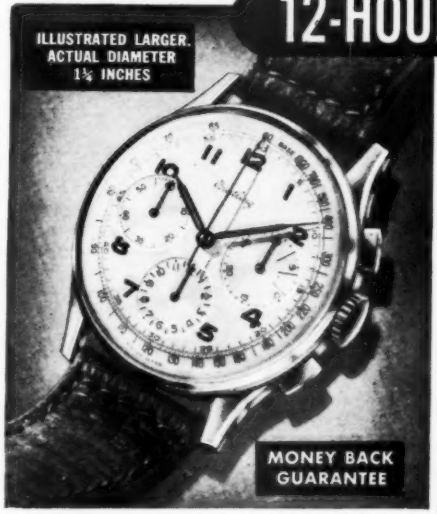
• AERONAUTICAL ENGINEERING—B.S. DEGREE
• CERTIFIED ENGINE MECHANICS
• SPECIAL A. AND E. MECHANICS REFRESHER AND COACHING COURSES FOR U.S.C.A.A. EXAMINATIONS
• AVIATION ADMINISTRATION
• AERO. ENGINEERING DRAFTING. (Tech. Inst. curriculum approved by Engineers' Council for Professional Development.)

APPROVED FOR VETERANS' TRAINING

Founded by Curtiss-Wright. Outstanding faculty, modern equipment. Day, evening classes. Placement Service. Member of the National Council of Technical Schools.

AERONAUTICAL UNIVERSITY
Dept. 2, 116 South Michigan Avenue, Chicago 3, Illinois
Please send me your free catalog "Opportunities in Aviation," and full information about the following courses:
☐ Aero. Engineering ☐ Refresher Course
☐ Engine Mechanics ☐ Aviation Administration
☐ Aero. Eng. Drafting
Name .....
Address .....

12-HOUR RECORDER!



BRAND NEW WRIST WATCH
17-Jewel—Famous Swiss Movement
2 Pushers, 6 Hands, 2 Recorders.
Less than half the regular price

ONLY $59.50 includes tax

Use as a stop watch. Solves navigation problems, computes ground speed and fuel consumption. Wonderful for flying, races, games, boating, etc. Non-magnetic. Genuine leather wrist strap. Extra flat stainless steel case. Handsome to look at, a pride to own, perfect for gifts and a lifetime of accurate timekeeping.

••••••ORDER BY MAIL NOW—POSTAGE PREPAID••••••

Please send me _____ chronographs at $59.50 each. It is understood that if I am not satisfied, I may return my purchase within 10 days after receiving it for full refund.

I enclose $_____ Check ☐ Money order ☐
Name _____
Address _____
City _____ Zone _____ State _____

WHITE PLAINS WATCH CO. INC.
RIVER PARK 17C, WHITE PLAINS, N. Y.

WRIST WATCH
STOP WATCH
TELEMETER
TACHOMETER

Phenomenal Value!
17 JEWEL • 2 PUSH BUTTON
CHRONOGRAPH
ONLY $29.75 PLUS 10% TAX

INCABLOC SHOCK RESISTANT FEATURE
• Sweep Second Hand • Radium Dial • Anti-Magnetic • Unbreakable Crystal. (formerly $71.50)
IDEAL FOR
• Physicians • Engineers • Radio Men • Sportsmen • Photographers • Aviators

OUR GUARANTEE
MONEY BACK IN 10 DAYS
If not satisfied for any reason
Watch enlarged to show detail

ADLEW JEWELERS
117 W. 42nd St., N. Y. C. 18
Mail Orders Promptly Filled. Shipped C.O.D. or send check or money order. Address mail orders to: ADLEW JEWELERS, 152 West 42nd St. (Dept. FL), NYC 18.

Also Available in 18K Gold Case $64.50 (Plus 10% Tax) formerly $125

Gas Turbine Engines . . . Boundary Layer Control . . . Laminar Flow Wings . . . Less noisy, more efficient propellers. . . .

These are all possible in a four-place, all-metal plane selling for the price of today's two-place jobs . . . SEE

FLYING OCTOBER ISSUE

WINDIKATOR

WINDIKATOR takes all the guesswork out of risky take-offs from small fields. A glance at your WINDIKATOR and you know wind direction, wind velocity, instantly and accurately! With exact wind data, you can plan safer, easier take-offs.

WINDIKATOR is precision-built, weighs less than two ounces, is guaranteed accurate! Pocket-size, non-magnetic, rust and corrosion resistant. Two models: Model A indicates velocities 5-30 MPH; Model B, 10-60 MPH. Costs only $8.75, at sporting goods stores; handsome leather belt carrying case $1.50. If dealer can't supply you, write Dept. F-9 . . .

THE H. M. SAWYER & SON COMPANY
Cambridge, Massachusetts

TINY RADIO!
FITS IN YOUR HAND
REALLY WORKS TOO! Unbreakable RED plastic Cabinets. NO TUBES, BATTERIES OR ELECTRIC "PLUG-INS"! Works on new Patented "Permacrystal" and Roto Tuner! EASY TO USE! SHOULD LAST FOR YEARS!
GUARANTEED TO WORK On local radio programs by following directions!
ONLY $3.99 Postpaid or send only $1.00 (bill, money order or check) and pay postman $2.99 plus postage on delivery. COMPLETE READY TO PLAY — WITH PERSONAL PHONE — MARVELOUS GIFTS—BARGAIN PRICED! GET YOUR TINY RADIO NOW!
PAKETTE PRODUCTS CO., Inc., Dept. TF-8, Kearney, Neb.

Latest editions
U. S. Coast & Geodetic Survey
AERONAUTICAL CHARTS
complete stock always on hand
Send 3¢ stamp for catalog
RAND McNALLY & COMPANY
7 W. 50th St., New York 20, N.Y.
536 S. Clark St., Chicago 5, Ill.

is a hard landing.

Recently one of our airlines landed a plane at 750 feet a minute. Work this out with your square factor. You see, you can do it in your head. That's the place to do it. That's the way the pilot of that particular plane is going to do it after this. There is a story that the pilot got out and said to his airline student, "See?" END

Built-In Airstrip

(*Continued from page* 33)

a fairly rough, grassy area with patches of heavy gravel and cinders. As the Cessna settled right on the spot, Pearson jammed on full brakes. I grabbed the instrument cowl and held my breath waiting for the nose to drop and the propeller to grind into the runway.

Instead, we skidded to a stop, with the wheels locked and gravel slamming against the fuselage like hailstones. Never once did the tail threaten to rise. I got out and paced off the distance from actual touchdown to full stop. It was less than 150 feet.

Normal landing roll of a Cessna 140, without brakes, under no wind conditions is in excess of 700 feet. With the standard wheel stabilizer in a full tail heavy position, with full flaps, and using as much brake as can safely be applied under similar conditions, the Cessna could normally be brought to a halt in about 400 feet. The device with its lead weight on a trolley had more than halved the landing distance.

I took over the controls to see if I could match Pearson's landing. He had made more than 700 such landings with this particular plane so I didn't expect to come close to duplicating it. On the landings, even though my brake pressure tended to be cautious, the landing roll was not more than 200 feet.

Then I took the Cessna for some solo tests to determine the reaction with less weight in the cabin. The efficiency increased proportionately. I made landings and take-offs upwind, downwind, crosswind, with flaps and without them. Next, I reeled the Safeland forward so I could release it while in the air. On the downwind leg I banged the release handle with my elbow and heard the weight slide and lock in the tail. Even in the air the noise was noticeable. Witnesses on the ground stated they could hear it even though I was at 800 feet altitude. The unit's performance was consistently good, with the average landing roll from point of impact to that of full stop averaging around 175 feet.

The entire unit can be installed by any mechanic in a maximum of five hours. A dural channel is mounted within the fuselage airframe, with the front end bolted to the forward bulkhead, and the other end bolted and beam braced to the rear bulkhead, or fuselage former.

Riding within the channel is a 12-pound rectangular lead weight to which a steel cable is attached at the front end and a rubber-snubbed, spring-air shock absorber mounted at the rear.

The only visible part of the unit is a small control handle and a four-inch hand reel which, in the Cessna 140, is mounted centrally on the rear cabin wall above the baggage compartment. Hitting the control handle releases the lead weight which slides rearward instantly and locks at the aft end of the channel. Three pin locks, similar to a beveled door latch, secure the weight in the rear position.

To return the weight to the forward position, the released handle is held back, releasing the three lock pins, and the hand reel pulls the weight forward and locks it there. On the Cessna 140, the Safeland unit changes the baggage allowance to 44 pounds.

Aerodynamically, the characteristics of the Cessna I flew were practically unchanged, with a slightly tail heavy trim.

A special Safeland rigged up for a Piper J-3 *Cub*, has permitted a record landing within 40 feet according to Pearson. However, in its present form the Safeland cannot be adapted to Piper planes. The angle of slope within a Cub airframe is too small.

The device could be a boon or a headache to the average Sunday or week end pilot. It positively minimizes the possibilities of a nose-over if a pilot gets into a tight spot, becomes rattled, and jams on the brakes. Conversely, if the pilot becomes used to the Safeland unit in a plane, and then flies a craft not similarly equipped, he might get into trouble by reacting automatically, forgetting the weight stabilizer is not available.

It does have unquestioned value in short field landings, and gives increased safety in taxiing over the rough ground, mud, or snow. It could also be advantageous to cross country pilots at high altitude airports where the landing and take-off performance of a plane is altered.

In order to gain CAA approval the device proved it would not increase the spin characteristics of an aircraft, or if the plane is spun, either intentionally or inadvertently, that its recovery would be normal.

Inventor of the Safeland is Jack Spiegel, a Philadelphia manufacturer. He developed his interest in aviation during his school days in Russia, where a French teacher taught him to build and fly model planes. In 1927 he obtained his first pilot's license and has been actively engaged in the development of personal planes and devices since then.

The Safeland costs $300. Installation at the factory is free, but persons wanting to have a unit installed at their home base can do so, with average time running from four to five hours, depending upon the aptness of the mechanic. Printed instructions accompany the unit, showing boltings at the front and rear bulkheads. Cardboard templates are included to position the bolt holes.

If you have a lightplane, plus $300, and want to give your plane and yourself greater short field utility plus the assurance of above average safety in emergency landings, the Safeland is about as useful an auxiliary device as I can imagine. END

"AOPA - - - The Answer To The Private Pilot's Prayer"

pilot STEWART GROVES

More than 40,000 private pilots agree with this statement. They know that in AOPA they get more dollars and cents value for the money they put into their private flying. They know that through AOPA the headaches and bottlenecks of restrictions and red tape are reduced to a minimum. They are confident that no matter where they fly, special privileges and extra services are available as soon as they present their AOPA membership card.

That's why AOPA is the largest most powerful organization in private aviation. There is no other association that offers so much, to so many pilots and plane owners. In addition to the many money and time saving advantages and services listed below (next to your membership application blank) there is the big round-the-calendar program of protective representation against unfair and selfishly misdirected opposition to private flying that AOPA is conducting as vigorously, and productively, today as they have for so many years past.

Membership dues are just $5.00. Any member will tell you that they save more than this through just one of the many service features of their AOPA membership. And don't overlook the subscription to the special AOPA edition of FLYING that you get with your membership too. JOIN TODAY AND START CASHING IN ON THIS TIME AND MONEY SAVING WAY OF FLYING RIGHT AWAY.

"I sincerely appreciate your guidance and encouragement in my behalf. There is no doubt in my mind that AOPA is the answer to a private pilot's prayer in today's snarl of legalized regulations and red tape."

Pilot Stewart Groves
AOPA Member Pilot No. 7656

SEND IN ATTACHED COUPON TODAY!

Valuable AOPA Service FREE to Members

The Washington staff of AOPA will help you in personal flying problems, licenses, regulations, legal tangles, plane sales and purchases, documents, employment. Also national AOPA-Hertz Drive-Ur-Self courtesy card with special advantages; AOPA Washington Newsletter; each month the special AOPA edition of FLYING magazine; TWA-AOPA courtesy card assuring service and maintenance facilities at most TWA airports, advantageous aviation insurance service; low cost aircraft finance service; distinctive AOPA pilot's wings, emblems for your plane and car, and membership card. Above all else, AOPA continuously protects and fights for your flying interests in government and other circles.

"AOPA"
AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AIRCRAFT OWNERS AND PILOTS ASSOCIATION
National Headquarters, Dept. F-948
Washington Bldg., 15th and N.Y. Avenue, N.W.
Washington 5, D.C.

I first soloed an airplane at.....in the year.....
I own aircraft NC.....Make.....
I hereby apply for membership in AOPA.
Enclosed find check or money order for.....
(U. S. A., Canada, Mexico, Central & South America, $5.00; All other Foreign, $6.00.)

NAME.....
Please Print

ADDRESS.....

CITY & STATE.....

PILOT LICENSE NUMBER.....

SIGNATURE.....
$1.80 of each year's dues are for my subscription to the AOPA Edition of FLYING

Classified Advertising

RATE: 25c PER WORD

FIRST 15 WORDS $3.00

AIRPLANES FOR SALE

AERONCA

AERONCA Champion, 1946, 140 hours, good condition, hangared, $1300.00. Lynn D. Timmerman, Box 916, Lima, Ohio.

AERONCA Chief, 1946, 380 hours, engine perfect. Just rejuvenated and repainted, $1175.00. Write, Box 294, Corinth, Miss.

'47 AERONCA Chief. Less than 100 hrs. Harvey Wells transceiver. Excellent condition. $1750. Consider 40 or 41 Chevrolet in trade. Will deliver. Merril Baumann, Kiester, Minn.

BEECH

DELUX two door, five place Stagger Beechcraft; 450 Pratt Whitney; 1500 mile range; 200 gal. gas capacity; leather upholstered; never damaged, excellent care, private mechanic; two-way radio; day-nite instrument flying; reasonably priced. Charles Marshall, 354 Taylor St., San Francisco, Calif. Prospect 5-6727.

BONANZA, 160 hours, no crack-ups, maintained by USAF, complete with extra gyros, extra navigators compass and extra tank giving 6 hours autonomy, available end of July. Contact Mrs. Mitchell, 1715 22nd St., N.W., Washington, D. C. Decatur 1286.

BELLANCA

BELLANCA: 1946 Cruisair No. 87810. Always hangared. New, clean condition with 33 hours total time. Has radio, gyros, aeromatic propeller, seat chutes, soundproofing, etc. Asking $3950. No trades. Apply Powers & George, 475 Fifth Ave., New York, N. Y.

CESSNA

CESSNA: 1946, 140, No. 90330. Flown 92 hours and in new condition. Primary blind instruments, two-way G.E. radio, and retractable landing light. Asking $1900. Make offer. No trades. Apply Powers & George, 475 Fifth Ave., New York, N. Y.

TWIN Engine Cessna, heavy wing. All accessories, including new radio compass, new leather upholstery, new tires and steel props. Total hrs. since new 825, licensed. Privately owned. Write R. R. 2, Box 305, K&K Washed Sand & Gravel Plant, South Bend, Ind.

CESSNA At-17A, silver, red enamel trim, black pin striping. Cream and red plastic upholstering. Licensed for 5 people. Work on plane finished in May. Must sell immediately. Have $2500. Time and money invested. Want to sell. Open for offers. Write to Nelson G. Thomas, 327 Douglas St., Salt Lake City, Utah.

1947 "140," INSTRUMENTS, transceiver, auxiliary seat, new type gear, pants, Met-L-Prop, 78 hrs., hangared, $2925. Galaida 1067 Rahway Ave., Avenel, N. J.

TWIN Cessna: Plush executive type transport. Interior is finished in Blue Velour upholstering. The exterior is a canary yellow trimmed in deep maroon. Full instrumentation and Hamilton Constant Speed props. Mfg. in October of '43. Total time on each engine is 494:00 hours. This is a very clean Cessna. Priced at only $1800. Frank S. Knapp & Son, 400 4th St., Three Rivers, Mich.

1947 CESSNA 140. Total time 165 hours. Just relicensed. Always hangared. Price $2250. Sud. Emerson, Wyoming, Delaware. Phone Bedford 2021.

LATE 1946 Cessna 140 full instrument group, metal prop. 160 hours. One owner and always hangared. Price $2150.00. Howard Shockey, Alamosa, Colo.

CESSNA Twin Engine, heavy wing, wings and tail group, etc., recovered. Special hand rubbed finish in metallic gray and trimmed in vermilion. Has outside baggage door, boarding ladder, raised rear floor, prop spinners, new carpeting, new battery under Co-Pilot's seat, 50 watt transmitter, new ADF, and two receivers Full instruments including Pioneer direction indicator. Ship licensed 5 place. This craft is in excellent condition in every respect. Low time on aircraft and only 175 hours since engine majors. Ship always hangared. Price $3500.00. G. D. Carter, 1040 E. 47th St., Chicago, Ill. Phone Kenwood 7520.

CESSNA for sale. NC 75 905; perfect condition; heavy wing; twin engine; five place; deluxe upholstered interior; outside baggage door; engines total time 601.25 hours; aircraft total time since reconditioned 147.25 hours; Hamilton constant speed propellers; complete set of blind flying instruments; Beacon receiver and automatic direction finder; used exclusively for business; no longer needed. Phone, wire or write Great Central Insurance Co., Peoria, Ill.

FAIRCHILD

FAIRCHILD, 24W 165 h.p. Red with cream trim, licensed day, night and instrument including Grimes landing light, fluorescent and moon-glo, Bendix two-way radio, sixty gallon tanks. $3500. C. M. Hayes, Hulman Field, Terre Haute, Ind.

GRUMMAN

GRUMMAN: Goose G21A, No. 70274. Completely rebuilt, corrosion proofed, recovered, re-upholstered, and re-licensed January 1948. Engines have 490 hours total. Has de-icing equipment, ADF, gyros, automatic pilot, etc. Apply Powers & George, 475 Fifth Ave., New York, N. Y.

GRUMMAN: Mallard No. 3049 with 250 hours total time. 10 passengers, 2 crew. Relicensed and all bulletins executed in May. Top condition. Duplication cost over $135,000. Asking $85,000. Apply Powers & George, 475 Fifth Ave., New York, N. Y.

ERCOUPE

ERCOUPE, 70 hours, in excellent condition, 2 way radio, sensitive altimeter, direction finder, heater, starter, metal propeller, quick drain gascolator, cruises 115, 5 gallons per hour, cost new $4100, sell for $2500. Bought larger plane. Dr. W. J. Ryer, Hawthorne, N. Y. Pleasantville 898, days.

ERCOUPE, 1946. Beautiful, like new, always hangared, 33 hours, original owner. Will sell or trade for new car. R. A. Schacht, 1585 Forest View Drive, Kirkwood 22, Mo.

ERCOUPE, 415C, late 1946. Total time 190 hours, sensitive altimeter, Bendix receiver and transmitter, loudspeaker, headset, the best microphone, loop, Sperry Altitude Gyro, outside air temp. navigation lights, starter, generator, new type nose spinner, flies very well and in very fine condition. Fabric is hand finished. $2100. Cloyes Gear Works, Inc., 17214 Roseland Road, Cleveland 12, Ohio.

'46 ERCOUPE, 175 hrs. Excellent condition, never damaged, privately owned. All bulletins complied including new gas tanks. Price $1800. Contact Dr. Wm. DiMeo, 185 W. Main St., New Britain, Conn.

ERCOUPE, 1946 Model 415C, Continental C-72-12 engine. Less than hundred hours Extra clean. Sacrifice for $1500. Contact P. L. Brown, Ivanhoe, N. C., "By Wire."

ERCOUPE, late 1946. Never damaged. Harvey Wells two-way radio with directional loop. Sensitive altimeter. Navigation lights and starter. McCauley prop & original. Make an offer. T. F. Stafford, Box 1073, Warrenton, Va. Phone 785-J.

ERCOUPE, 1946 Model 415C, two-way radio, clock, 190 hrs. Relicensed Apr. Good condition, price $1800. Martin Higgason, Pawnee, Ill.

ERCOUPE, 190 hours, excellent condition, priced to sell immediately, $1650. Kelley, 58 Exchange St., Binghamton, N. Y. Phone 4-4318.

HOWARD

SKYWAY Howard. Have another Howard which I modified like "The Wright Way" of Skyway story. The best cross country personal plane and most for the money in private flying history. Ted Patecell, 1989 78th St., Jackson Hts., N. Y.

LOCKHEED

LOCKHEED Lodestar, 9 passenger (plus pilot, co-pilot) Model C-60, executive transportation. Seating equipment, lounge, luggage rack, clothes closet, five reclining chairs. Radio equipment, Bendix RTA, 1B transmitter and receiver, auxiliary receiver, beam receiver 200, 400 kilocycles, ADF direction finder. Complete with quantity spare parts and spare engine. Recently completely overhauled by Wright Aeronautical. Excellent condition. Has been hangared and serviced by American Airlines and used solely for chief executive transportation. Chicago Tribune. Price $45,000.00. Chas. B. James, Purchasing Agent Chicago Tribune, Chicago, Superior 0100.

PIPER

1947 CRUISER: Starter, 2 band radio, heater, sensitive altimeter. One owner, always hangared, 90 hrs. total, $2500.00. Benton L. Gaulden, Pocomoke City, Md. Route No. 2.

LIKE new '47 Super Cruiser, less than 200 hours by private owner. Landing light, radio. Can finance. $2485. Charles Hayes, Hulman Airport, Terre Haute, Ind.

MAY, 1947, 100 H.P. Super Cruiser Seaplane, Edo No. 2000 floats. Under 250 hours. Newly reconditioned and corrosion proofed. Specially reinforced Longeron assembly. Relicensed May, 1948. Instruments include Hallicrafter two-way radio and stall warning. Aeromatic prop. Land gear included. Ship in top condition. Priced low at $4450.00. Owner has a larger ship. Bowles Agawam Airport, Agawam, Mass.

PIPER, J3C, NC 51541, 65 Continental, hydraulic brakes, good fabric, being relicensed. $900. Owner, John Stively, Liberty Grove, Md. Hangared at Lovett Airport, Elkton, Md.

PIPER, Super Cruiser, Dec. '46. Always hangared. Private owned. Like new. Has turn and bank Ind., sensitive, altimeter. Just licensed. Will sacrifice for $2200. Arnold Jones, Box 63, Cooter, Mo.

PIPER PA-11, total time, 60 hours. Like new, $2000. R. Pardue, 2905 Cherry St., Wilmington, Del. (165)

CUB L-65. Low time since major, recovered. Licensed. One piece windshield. New prop. Skiis. Excellent condition, $600. Will take car. Henchen Bros., Gotham, Wis.

REPUBLIC

REPUBLIC Seabee, RC-3, manufactured 5/47. Steerable wheel, Hartzell reversible, always hangared. 130 hrs. total, never scratched. Condition perfect. $4500.00. Box 595, % Flying.

SEABEE 100 hours. Relicensed June. Reversible propeller, two-way radio. Cross country panel, never in salt water. $4,000. Box 491, Nashville, Tenn.

SEABEE: 85 hours, like new, fully-equipped, radio, 2 fans, steerable tail wheel, set of covers. Never in salt water. Serial 716, $5.500. Petroff Slaby, 805 N. 28th St., Milwaukee, Wis.

'47 SEABEE, 120 hrs. licensed till June 1949. All bulletins complied. Perfect motor, 2 way radio, factory modernized prop, never cracked. Need the money, $3600.00. Mill Bridge Roller Rink, Lyons, Illinois.

SEABEE: 4 place with 20 gal. auxiliary gas tank. Excellent condition. Just relicensed. All bulletins complied with. Flown by owner pilot only. 1 year old. 205 hours. Never cracked. Directional gyro, thermocouple, flight hour recorder and steerable tail wheel. Jettisonable doors. New armor tipped propeller and assembly just installed by Hartzell. Forced to sell this ship with extra armor tipped propeller, battery and miscellaneous parts. $4400 cash. Farwell Perry, 310 E. 45th St., New York, N. Y.

SEABEE 1947 model 6328K, 100 hrs. All bulletins complied with, steerable tailwheel, landing light, reversible propeller, excellent condition, relicensed April '49, will deliver within 500 miles. Ship at northeast aviation, Portland, Maine. Accept new or nearly new Ercoupe in trade. G. Wuttke, 31 2nd St., Mineola, N. Y.

PORTERFIELD

PORTERFIELD LP-65. Just relicensed, new fabric. Perfect condition. $599. Ellis M. Huston, Windsor, Mo.

STEERMANS

PT17, NEWLY majored engine, fabric excellent, a good airplane. Will sell or trade. Vernon Duwe, Weeping Water, Nebr.

SWIFT

GLOBE: 1946 Swift 125 No. 81997, with 325 hours total time, Aeromatic propeller and G.E. Radio. Always hangared. Never cracked. Asking $2100. Offers considered. No trades. Write Powers & George, 475 Fifth Ave., New York, N. Y., for details.

SWIFT '85. 43 hrs. Equipped like 125 deluxe. Selling because no time to fly. $2300. R. E. Gardner, M.D., Reynoldsburg, Ohio.

STINSON

STINSON: 150, No. 98205. Exceptional condition. Always hangared. Never cracked. 2 transmitters, 2 receivers, complete gyro instruments, extra engine instruments, spare propeller and tires. Asking $3500. No trades. Write Powers & George, 475 Fifth Ave., New York, N. Y.

STINSON: 165, No. 9846K. Built May 1947. Factory corrosion proofed. Float fittings. 34 hour total. Relicensed June. Perfect condition for land or water use. Asking $5000. No trades. Write Powers & George, 475 Fifth Ave., New York, N. Y.

1946 STINSON 150 Voyager, blue, 135 hours. Privately owned, always hangared, just like new, all standard instrument plus sensitive altimeter, R of C; T & B: clock, G.E. 2-way radio. Landing lights; flight hour meters; pants. $4,000.00. Boyd-Giomi, 5836 Delmar, St. Louis, Mo.

1947 RED Stinson 150. Outside baggage, Aeromatic with spinner, radio compass, powerful transmitter and a custom built panel of mahogany trimmed in chrome that is a masterpiece in workmanship, beauty and utility, filled with every expensive instrument your heart could desire. Ship always hangared and polished. Never cracked. Total time 250:00. Licensed to April 1949. Price $4650.00 and dare you to find as nice a one at any price. H. P. Queen, 131 S. Florida St., Buckhannon. W. Va. Phone 493R.

1948 STINSON Station Wagon. A beautiful ship in brand new condition. 75 hrs. Recording tachometer, primary group plus 2-way radio, landing lights, stall warning indicator, etc. Handsome maroon finish. $5600. Contact Dr. Wm. DiMeo, 185 W. Main St., New Britain, Conn.

5 PLACE Stinson Reliant, excellent condition. Asking $2750. Arnold Socha, Green Acres, Main St., Sparta, N. J.

TAYLORCRAFT

1946 TAYLORCRAFT Model BC12D. License November 1948. Total time 50 hrs. Ship like new. D. E. Mumbaugh, 4805 New Road, Youngstown 7, Ohio.

1946 TAYLORCRAFT. Blind group, transceiver, wing tanks. New condition. Cruises 102. 144:55 honest time. $1650.00. James Stargel, 246 Whitmoor, Silver Spring, Md.

1941 TAYLORCRAFT BC 12 Delux, $1000. Privately owned, always hangared, 800 total hours on engine and aircraft. This includes brand new Waller 12 watt transmitter and receiver. Will deliver for expenses. Robert Tokunaga, Shandon Greenhouses, Columbia, S. C.

VULTEE

3-PLACE BT-13 all-metal, just licensed. Must sacrifice, will sell to highest bidder. Make me an offer. F. B. Knepper, 1109 E. Elm St., Tucson, Ariz.

MISCELLANEOUS

SKYRANGER C-185, sensitive altimeter, rate of climb, turn and bank, RCA receiver and transmitter, new tires, recent refinish red and ivory, cruise 108, very low total time. $2150. Jerry Hoffer, Camden, S. C.

BIRD, licensed three place, $500. Milton Meerdink, 612 Ridgeway Ave., Rochester, N. Y. Glenwood 1405-W.

47 FUNK Airplane, starter, lights, radio. Thirteen hours by instructor., Always hangared. $2750. Or will trade for late car, tractor or combine. Howard Phifer, Ulysses, Kans.

AVIATION EQUIPMENT

COMPUTERS, Dalton Model G, which straps to the leg, (formerly sold for $50) now only $7.50; Rolaire deluxe map cases for safe, easy pilotage, $14.95; AAF-type A-2 computer, $2; Weems plotter for measuring courses, speeds, distances, $2; New Model American Airlines computer in leather case $5.00; E-6B, Army computer, most widely-used computer in aviation $10 (with leather case) and from our large war surplus stock; Army D-12 aperiodic compasses for aircraft, and marine vessels, $12.50; Astro-compasses with instructions, now only $8.75; Longines pocket compasses new $1.20; Dietzgen 6 inch protractors, 20c; Elgin pocket stopwatches, like new, $12.75; Bausch & Lomb sextants, $37.50; F-8 aerial cameras, a "best buy of the month" at $175. Pan American Navigation Service, 12021 Ventura Blvd., N. Hollywood, Calif.

CIVIL Air Patrol T-Shirts, beautifully designed in red, white and blue. Cut-Rate Military Store, Fayetteville, N. C.

JUST released for sale. Dalton E-6-B computers, strap on leg when flying, in metal container, turn dial with knob, instructions furnished. Will liquidate for $7.00. British Surplus Commodities, 5625 N. Spaulding Ave., Chicago 45, Ill.

M-3 AAF Type Sunglasses $2.25 ea. Special 2 pair for $4.25. Genuine ground and polished green lens. 24 Karat gold plated frames. Mother-of-pearl sweatbar and adjustable nose pads. Leatherette carrying case included. Lifetime Service Guarantee. Free postage on prepaid orders. C.O.D.'s accepted. Remittance payable to: R. Kops, 1645 N. Wells St., Chicago 14, Ill.

L-1 FLYING Suits in forest green wool gabardine with nine zippered pockets. Sizes in medium-regular, medium-long and small-regular, $9.95. R.A.F. Mfg. Co., 6 E. Lake St., Chicago 1, Ill. Buy direct and save.

K-1 FLYING Suits in light tan made of durable Byrdcloth in sizes medium-short, medium-regular, medium-long and large-regular all with nine zippered pockets, $9.95. R.A.F. Mfg. Co., 6 E. Lake St., Chicago 1, Ill. Buy direct and save.

NAME Strips. Your name printed in gold with wings on a leather strip which can be sewn on any type of jacket or flying suit. Only 75c per strip. Sorry, no C.O.D.'s. R.A.F. Mfg. Co., 6 E. Lake St., Chicago 1, Ill.

KNITTED Cuffs and Bottoms for replacement on Leather Jackets, Cuffs 75 cents, Cuffs and Bottoms $2.00. Money order, no stamps. Postage prepaid. Arenz Knitting Mills, 116 S. Catalina Ave., Redondo Beach, Calif.

GENUINE Glarex AAF Type Sunglasses. Precision ground and polished lens, 24 Karat Gold Plated frames, for $2.75 per pair less 25% discount to dealers in lots of one (1) dozen or more. Beautiful display case to dealers with orders of two (2) dozen or more if desired. Each pair has attractive carrying case included. Lifetime Service Guarantee. Money refunded if not satisfied. R.A.F. Sales Co., 6 East Lake St., Chicago 1, Ill.

ARMY K-3B Camera, 7x9, with cables, filters, handles, viewfinder 8¼" cone tested, excellent condition, $260.00. 9x9 magazine extra, $30.00. Have other aerial photo equipment. Monroe Motor Sales & Service, 62 E. Elm Ave., Monroe, Mich.

BOOKS

ATTENTION: G. I. Operators, you are permitted under your contract to specify Zweng publications when required or desirable. The law does not compel you to accept a particular text. Zweng publications have over a period of years lessened the burden imposed on the Operator and Ground Instructor. Discounts are above average. Many of the alert Veteran Approved schools now specify Zweng publications, Viz: Aeronautical Training (Commercial and Private Pilot Rating) $3.00; Meteorology for Airmen $3; Radio and Instrument Flying $4; Aeronautical Navigation, $3 (to replace Bulletin No. 24 out of print). Flight Instructor, $3; Link Instructor, $4; Airline Transport Pilot, $4; Civil Air Regulations for Pilots, $1; Aircraft and Engine Mechanics, $3; Flight Engineer, $4; Parachute Technician, $3. (Write for catalogue with discounts.) Pan American Navigation Service, 12021-FC, N. Hollywood, Calif.

COMMERCIAL and Private Pilot Ratings: Quiz system text by Charles A. Zweng will help you win your flight ratings. For both commercial and private ratings, $3.00. Latest map-type examinations, with answers, are included. Pan American Navigation Service, Dept. FC, 12021 Ventura Blvd., North Hollywood, Calif.

FLIGHT Instructor by Charles A. Zweng, for C.A.A. examiners and applicants for flight instructor rating. Only book available which shows grading methods for flight maneuvers, and new oral examination including typical multiple-choice examination questions and answers. $3.00, postpaid or C.O.D. Pan American Navigation Service, Dept. FC, 12021 Ventura Blvd., N. Hollywood, Calif.

CAR for Pilots, a new book of Civil Air Regulations which apply to airmen of all ratings. Arranged & Indexed for fast, simple reference to any desired regulation. Postpaid or C.O.D., $1.00. Pan American Navigation Service, Dept. FC, 12021 Ventura Blvd., N. Hollywood, Calif.

AIRCRAFT Year Books. Back-date Magazines. Arkell's, Tarzana 3, Calif.

BOOKBINDERS! Scarce, out-of-print, unusual books, quickly supplied. Send wants. Clifton, Box 1377 fm, Beverly Hills, Calif.

MECHANICS' Examinations can be found in "A. & E. Mechanics' Manual" (Zweng). New revised edition contains questions & answers not available elsewhere. 254 pages, $3.00, postpaid or C.O.D. Pan American Navigation Service, Dept. FC, 12021 Ventura Blvd., N. Hollywood, Calif.

FLIGHT Engineers: Charles A. Zweng's new "Flight Engineers Manual" contains typical examination questions and answers for flight engineer rating. $4.00, postpaid or C.O.D. Pan American Navigation Service, Dept. FC, 12021 Ventura Blvd., N. Hollywood, Calif.

NOTICE: Bulletin 24 is no longer being printed by the government. Operators can specify "Aeronautical Navigations" by Charles A. Zweng. $3 list. Discounts to Dealers. Outstanding G. I. approved schools are using Zweng texts. (Free catalog.) Pan American Navigation Service, 12021-FC, N. Hollywood, Calif.

ATTENTION Mechanics: Do you want your C.A.A. Aircraft and Engine License? "Ross Aeronautical Services" have spent two years compiling material which will enable you to obtain your licenses within 30 days and we guarantee you to pass your C.A.A. written examinations or every cent of your money will be refunded. Complete multiple choice examinations have been compiled on each phase of the latest 1948 C.A.A. Aircraft and Engine written examinations. This material previously sold for fifteen dollars; however, the overwhelming demand has enabled us to quote the following prices: Aircraft Mechanic $3.00; Engine Mechanic $3.00; both for $5.00. Sent postpaid or C.O.D. Our money back guarantee is dated and included with every set of examinations. Ross Aeronautical Service, Dept. F., P. O. Box 1794, Tulsa 1, Okla.

MECHANICS, Pilots, Instructors: New "Ross" Guaranteed Questionnaires just off the press to help you obtain your C.A.A. Ratings. "Engine Mechanic," $3; "Aircraft Mechanic" $3; both for $5 (these two Questionnaires cover the very latest examinations including the same diagrams as used by C.A.A.). "Commercial Pilot," $4 (this Questionnaire covers Aircraft and Engines, Navigation, Meteorology, C.A.R. and includes the same navigation and weather maps used by C.A.A. on their exams). "Flight Instructor" $4 ("Must" for every pilot seeking his Flight Instructor's Rating); "Instrument Rating" $4. (This Questionnaire far excels any other publication on Instrument Rating. It is up-to-date and includes the same maps as used on C.A.A. exam.); "Engine Instructors" $2.50; "Aircraft Instructors" $2.50; "Navigation Instructors" $2.50; "Meteorology Instructors" $2.50 (All ground instructors' Questionnaires include a separate Questionnaire covering "Fundamentals of Instruction" without charge). Our "Money Back Guarantee" is dated and included with every order. C.O.D. or postpaid. Ross Aeronautical Services, Dept. 1-F, P. O. Box 1794, Tulsa, Okla.

AVIATION Quiz for all ratings & special subjects. Commercial Student Pilots; A new study book for the new Commercial Pilot exam. Questions and answers on regulations, navigation, meteorology, aircraft and theory, and engines. 200 easy-to-read printed pages pocket size, $2.50. Official "World Air Chart" included free. Cash prepaid or C.O.D. Private Student Pilots: A complete study course for private pilot exam. Questions and answers plus revised Civil Air Regulations. Printed large, legible type, 84 pages, pocket size. $1.00. Also Flight Instructor $2.00, Navig-Aid (Cross-Country Planner), $1.00. Cash prepaid or C.O.D. Sample Commercial Exam: Complete quiz 30 questions and answers on each part, regulations, navigation, meteorology, aircraft and theory, engines. Similar to CAA written. 50c cash. Hangar Flying, Dept. 1L9, 112 E. Grove St., Bloomington, Ill.

INSTRUCTION

BUILD, fly, bullet raceplane. Fast, economical low-winged lightplane. Blueprints $2.00. Corbcraft, 80-B Maxwell, Rochester 11, N. Y.

LINK Instructor Manual (Zweng) with examinations $4.00; other famous texts by Charles A. Zweng include: "Aeronautical Navigation" $3.00; "Flight Instructor" $3.00; "Ground Instructor" $3.00; "Ground Instructor Rating" $3.00; "Meteorology for Airmen" $3.00; "Radio & Instrument Flying" $4.00; "Parachute Technician" $3.00; "Airline Transport Pilot Rating" $4.00. Above books include new examinations. Ency. Aviation Dictionary $6.00. (Free Catalog.) Pan American Navigation Service, 12021 Ventura Blvd., N. Hollywood, Calif.

PRACTICAL Aircraft Hydraulics: 51 large, clear, colored illustrations. Includes diagrams of the DC-3, DC-6, Constellation, and Convair-Liner. Covers principles, systems, unit operation, and trouble shooting. Written for the student, mechanic, and pilot. Easy to understand. $3.85 postpaid. World Press, 1837 Champa St., Denver 2, Colo.

STUDENT Pilots: A complete study course for Private Pilot exam. New Civil Air Regulations plus questions and answers, 84 pages, digest size, printed with large, legible type, $1.00. Money back guarantee. Also Quiz books for Commercial, $2.50. Flight Instructor, $2.00. Navig-aid, Cross Country Planner, $1.00. C.O.D. or postpaid. Hangar Flying, Dept. 1C9, 112 E. Grove, Bloomington, Ill.

VETERANS: Be a pilot. Tuition paid under the G. I. Bill. Private, Commercial, Flight Instructor, Instrument, and Multi-engine Courses. Opportunities for part-time employment while studying. Ideal flying conditions. Write for information. Gottschalk School of Aeronautics, Adrian, Mich.

FLIGHT Training plus Electronics; The Florida Aviation Academy is the only private school offering you the following advantages. 1. Free housing on the field for students available to both veterans and civilians; furnished by the school. 2. Large modern Airport, three 200 x 5000 ft. runways used entirely for student instruction. 3. Restaurant and lounge right on the field, reasonable rates and good food. 4. Free Flight Training for Veterans under the G.I. Bill of Rights, offering complete courses, Private, Commercial, Flight Instructor, Instrument Seaplane Ratings and Radio Technician and Operators Course. 5. Recreational program, good fishing, hunting, boating and swimming and moonlight barbecues in a State famous for year around climate and outdoor sports. Write for descriptive pamphlet "A Career and a Vacation at the Same Time." R. H. Browning, School Director, Florida Aviation Academy (formerly The Stanford School of Aviation), Keystone Airport, Keystone Heights, Fla.

HELP WANTED

AIRLINE jobs. Recent survey of airline employment opportunities tells you what jobs there are and how to get them. Qualifications, salaries. Where to apply. $1.00. Christopher Publications, Dept. C-9, Box 111, Holtsville, N. Y.

70 AIR-GROUP program is creating thousands of jobs. $1.00 brings latest complete list of companies to contact for high paying opportunities. Christopher Publications, Box 111-CA9, Holtsville, N. Y.

NOTICE!

In replying to Box Numbers, be sure to address letters to

FLYING

185 N. Wabash Ave., Chicago 1, Ill.

Note: This does not apply to Box Numbers where City and State are shown.

OPPORTUNITIES: Complete Analysis & Report 1948 Aviation Employment Guide, $1.00. D. E. Drum, Aeronautical Consultant, P. O. Box 502, Stroudsburg, Pa.

PILOTS, Aircraft and Engine Mechanics, Aviation Workers. Confidential reports on who and where to contact for best opportunities and big pay. Domestic and Foreign. Free registration service and survey of employment opportunities. $2 cash or C.O.D. Reports for other fields available. Research Services, Personnel Department, Box 426, 1720 Market St., St. Louis 3, Mo.

PILOT shortage in South America! I was an airline pilot there until last May and can give you the latest information concerning companies, men to contact, best salaries, living conditions, and license requirements. Salaries up to $1,050 per month. Send $2 to: S. A. Information Service, Rooms 420, Texas and Pacific Building, Fort Worth, Tex.

ALASKA, The Last Frontier offers thousands of opportunities; $1 brings 1948 Copyrighted Report describing potential opportunities. Listings of firms in commercial Fishing, Mining, Aviation, Construction. Pertinent facts about Prospecting, Fur Farming, Homestead Lands. Tips for application. Free, map of Alaska. Alaska Opportunist, P. O. Box 883-F, Hollywood 28, Calif.

INTERESTED in Latin American & foreign employment? $1 brings Foreign Service Directory just off the press listing Oil, Mining, Aviation, Construction, Transportation, Manufacturing concerns by Personnel Expert. Hot tips for immediate application. Global Reports, P. O. Box 883-F, Hollywood 28, Calif.

SITUATIONS WANTED

POSITION wanted: Graduate of Spartan Airport Management and Operations Course. Hold C. A. A. private pilot and A&E license. 1300 W. Maple St., Lancaster, Wis.

LICENSED A&E desires position, preferably with Airport Operator. 7½ years experience, inspector & mechanic. Box 594, % Flying.

EX-WASP, college graduate, has commercial license with single, multi-engine, flight instructor, and instrument ratings. Desires position flying, or with some flying entailed. Free to travel. Available immediately. Box 596, % Flying.

VERY capable A&E wishes to do your maintenance work for a private concern. Don McClelland, 1623 E. 13th St., Tulsa 5, Okla.

PILOT. Own car & Globe Swift. Sales & extensive photographic background. Age 35, married. Box 597, % Flying.

FORMER Airline Pilot desires position as personal Pilot. No drinking, smoking, 32 years. Airline Pilot certificate. Box 593. % Flying.

COLLEGE graduate desires position as Executive pilot, Company Field representative, or pilot salesman. With the following qualifications: Commercial pilot single and multi-engine, instrument rating, licensed A&E mechanic, degree in aviation operation engineering, certificate of graduation from CAA approved Airline Dispatcher School, Meteorology Forecaster, ex-Navy Pilot, 1,500-2,000 hrs. First Pilot time cross country. Business reference Mr. R. L. Thornton, Chairman of Board, Mercantile National Bank, Dallas, Texas. For further details call, wire or write, 7-6419, Route 8, Box 223, Ft. Worth, Tex.

PATENTS

INVENTORS. When you are satisfied that you have invented something of value, write me, without obligation, for information as to what steps you should take to secure Patents or Trademarks. Write Patrick D. Beavers (formerly Randolph & Beavers), Registered Patent Attorney, 912 Columbian Bldg., Washington 1, D. C.

INVENTORS: When you are satisfied that you have invented something of value write me, without obligation, for information as to what steps you should take to secure a Patent. Write Patrick D. Beavers (Formerly Randolph & Beavers), Registered Patent Atty., 912 Columbia Bldg., Washington 1, D. C.

INVENTORS. Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John N. Randolph, Registered Patent Attorney, 218 Columbian Bldg., Washington 1, D. C.

BUSINESS OPPORTUNITIES

WISH financial assistance to establish complete Airplane and Engine repair base and storage hangar at large northern California airport. Investment can be amortized with high interest in six years or less. This is not a fly-by-night scheme, but a sincere long range program. $15,000-$20,000 handles. Details to interested parties only. Box 598, % Flying.

MISCELLANEOUS

"84 CARD Tricks," 25c! "Police Ju-Jitsu," 50c! "Scientific Boxing," 50c! Free catalogs. Hirsch, Spring Valley 14, N. Y.

AIRCRAFT photographs. Sample photo and illustrated 52-page catalogue listing nearly 5000 aircraft from World War I and II. 25c. Aeroplane Photo Supply, Box 195, Toronto, Can.

LEATHER name patches gold stamped with military or civilian wings, $1. 3 for $2. Clubs, schools, any design. Julies Leathercraft, Lone Tree, Iowa.

LEATHER insignias made to order. Send sketch or design. Satisfaction guaranteed. Julies Leathercraft, Lone Tree, Iowa.

WANTED: Financial backer for Aviation Venture. All inquiries confidential. Box 600, % Flying.

INDEX OF Advertisers SEPT. 1948

Adlew Jewelers 76
Aero Industries Technical Institute 61
Aero Publishers 74
Aeromatic Propeller Dept., Koppers Co., Inc. ..... Third Cover
Aeronautical University 75
Aircessories 70
Air Associates, Incorporated 51
Air-Parts, Inc. 73
Aircraft Devices Company 64
Aircraft Owners & Pilots Association 77
American Flyers 64
American Schools of Aircraft Instruments 6

Bausch & Lomb Optical Company 73
Beavers, Patrick D. 68
Beech Aircraft Corporation 14
Boque, Benjamin N. 60

Cal-Aero Technical Institute 69
California Flyers 8
Cessna Aircraft Co. 55
Champion Spark Plug Company 11
Cities Service Oil Company ..... Fourth Cover
Currey School of Aeronautics 71

Douglas Aircraft Company, Inc. 10

Embry-Riddle School of Aviation 13
Esso Standard Oil Company 49

Flightex Fabrics, Inc. ..... Second Cover

Goodrich Company, B. F. 3
Goodyear Aviation Products 47
Gottschalk School of Aeronautics 74
Grossinger Hotel & Country Club 60

Hotel Cleveland 72

Indiana Technical College 68
Irving Air Chute Co. 67

Kollsman Aircraft Instruments 66

Lear, Incorporated 59
Luscombe Airplane Corp. 72

McCauley Corporation 62

National Aeronautics Council 68
Northrop Aeronautical Institute 53

Pa-Kette Products Co. 76
Pan American Navigation Service 81
Phillips 66 Aviation Gasoline 5

Rand McNally & Company 76
Reading Batteries, Inc. 62
Republic Aviation Corporation 82
Ryan Aeronautical Company 57

Sawyer & Son Company, H. M. 76
Scott Aviation Corporation 70
Skytours, Inc. 74
Spartan University of Aviation 65
Standard of California 7
Stinson Division, Consolidated Vultee 12

Texas Engineering & Mfg. Co. 9

United Garment Mfg. Co. 68
U.S. Army & U.S. Airforce Recruiting Service 63

Weems System of Navigation 60
White Plains Watch Co., Inc. 75

WAR SURPLUS! MORE VALUES IN NAVIGATION EQUIPMENT!

We still have some great buys available in surplus sextants, compasses, clocks, etc., but the supply is limited. Take advantage of this opportunity to save!

SEXTANTS, BAUSCH & LOMB A-8-A (illustrated left). Both bubble and sea horizons. With averager, night lights, carrying case, all accessories. Like new, $49.75; in good condition $32.50

SEXTANTS, LINK A-12. Light, accurate, simple to operate. Fixed bubble, averager. With case and accessories. Good condition, only $12.50

CHRONOMETERS, made by Longines for the Navy. Mounted on brass gimbals in wooden case with glass cover. 36-hour movement. Like new $65.00

ELGIN STOP-WATCH, pocket size, reads to 1/10 second and has a five-minute elapsed time recorder. Fifteen jewels. New $12.75

AIR FORCE SEXTANTS FOR $12.50!

FAIRCHILD A-10 BUBBLE SEXTANT (illustrated, right). Adjustable bubble, lights, averager, case and accessories. Good condition $12.50

FAIRCHILD A-10-A BUBBLE SEXTANT, late model Air Force type, similar to A-10 but with electrically operated automatic averager. Excellent condition, $27.50; good condition $17.50

MAGNETIC COMPASS, Pioneer D-12, aperiodic type. No oscillation in rough air. Horizontal reading, fluorescent markings, rotatable verge ring. Diameter: 6 inches. Complete with compensating magnets. New $24.50

ASTRO COMPASS, Mark II (illustrated, right), standard Air Force and airline instrument for determining bearings, headings, compass deviation, etc. Complete with mounting base and carrying case. A real buy. New $12.50

F-8 AERIAL CAMERA, Navy release with Wollensak f/5.6 15-inch lens. Shutter speeds from 125th to 400th of a second. Uses magazine roll film 24 feet long. Size of photo: 5" x 7". Excellent condition $139.00

CHELSEA 8-DAY CLOCKS for operations office, hangar or den. Navy release. Black face with luminous numerals and hands, sealed case. Diameter: 7". New $39.50

ANEROID BAROMETER, Navy release. Reads from 27.70 to 31.30 inches in steps of .02 inch. Adjustable pointer on 5½" face to measure amount of pressure change. White dial with black numerals. For flight operations or home. New $17.50

SENSITIVE ALTIMETER. Reads to 30,000 ft. in 20-foot steps. Diameter: 3¼". Takes standard instrument mount. New $19.50

FREE! A NEW ILLUSTRATED CATALOGUE OF BOOKS AND EQUIPMENT FOR AVIATION, NAVIGATION AND PHOTOGRAPHY! WRITE TODAY FOR YOUR COPY!

Pan American Navigation Service

12021 VENTURA BOULEVARD F-9 • NORTH HOLLYWOOD, CALIF.

PLAN FOR SECURITY...

The mission of the United States Air Force is to defend this country against foreign attack. THREE major operational commands synchronize to further this mission. ¶ The Air Defense Command . . . to protect continental United States against air attack. ¶ The Strategic Air Command . . . assigned to intensive, sustained long-range bombardment and fighter operations, alone or in cooperation with land and naval forces. ¶ The Tactical Air Command . . . for attacking enemy aircraft, wrecking hostile troop-lines of communications, and destroying supply concentrations. ¶ Republic's P-84 Thunderjet is designated for duty with ALL THREE commands. The fundamental versatility, ruggedness and striking power of its predecessor, the mighty P-47 Thunderbolt, is inherent in today's 600 MPH THUNDERJET. ¶ Through the closest cooperation between the Air Materiel Command and Republic Aviation Corporation . . . a rapidly increasing number of P-84's are daily going into active service at American Air Bases . . . to guard the security of our nation . . .

REPUBLIC AVIATION CORPORATION, FARMINGDALE, LONG ISLAND, N.Y.

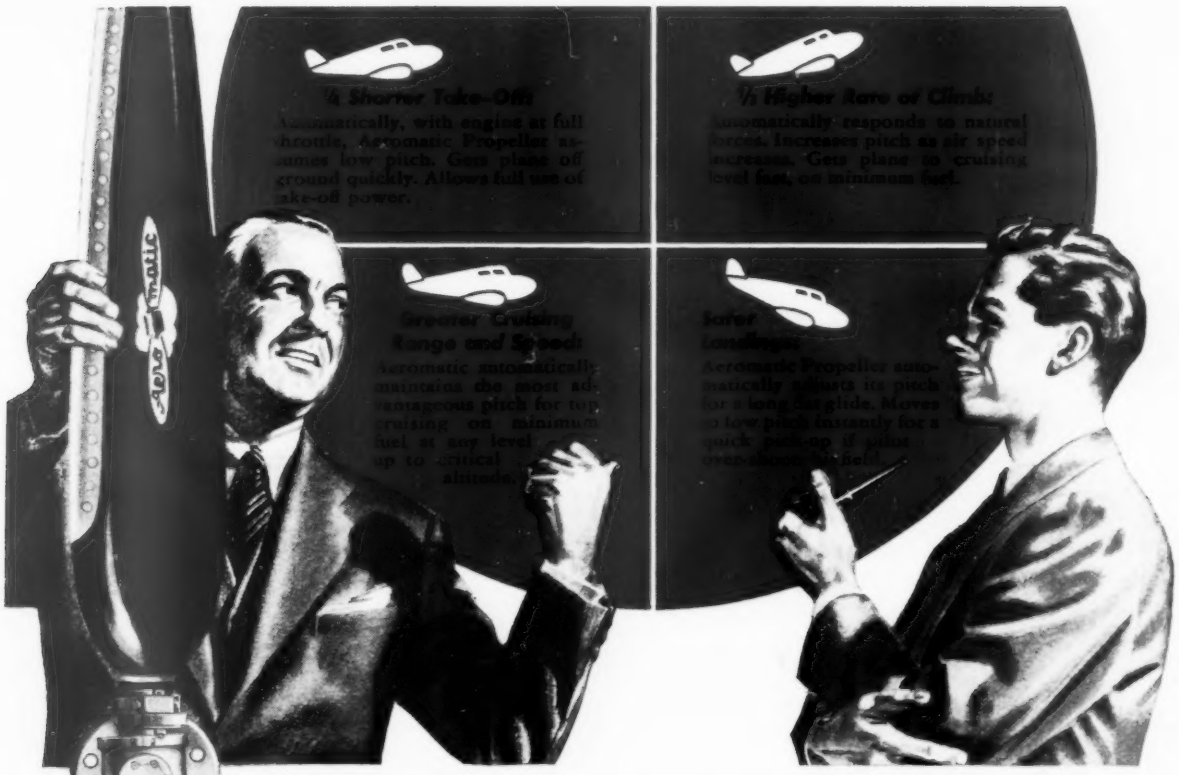
AIR POWER US AAF IS PEACE POWER

"This Is the Year of the Thunderjet"

REPUBLIC AVIATION

Makers of the Mighty Thunderbolt • Thunderjet • XF-12

Printed in U. S. A.


A Shorter Take-Off
Automatically, with engine at full throttle, Aeromatic Propeller assumes low pitch. Gets plane off ground quickly. Allows full use of take-off power.
½ Higher Rate of Climb
Automatically responds to natural forces. Increases pitch as air speed increases. Gets plane to cruising level fast, on minimum fuel.
Greater Cruising Range and Speed
Aeromatic automatically maintains the most advantageous pitch for top cruising on minimum fuel at any level up to critical altitude.
Safer Landings
Aeromatic Propeller automatically adjusts its pitch for a long flat glide. Moves to low pitch instantly for a quick pick-up if pilot overshoots field.

"Here's how an AEROMATIC® Propeller steps up plane performance . . . AUTOMATICALLY!"

Look at the 4 diagrams above. They show how an Aeromatic Propeller gets the most out of your plane. Whether taking off, climbing, cruising or landing, you're sure of peak performance . . . because your Aeromatic Propeller automatically selects the correct pitch for every flight condition. No extra instruments to watch . . . no controls to fiddle with. Aeromatic Propellers are the only completely automatic propellers on the market.

Write for information! If you own a plane or plan to buy one, enjoy the extra performance of an Aeromatic Propeller. Write to your aircraft manufacturer or distributor and ask about an Aeromatic for your plane. Or drop us a line for your free Aeromatic booklet. Koppers Co., Inc., Aeromatic Propeller Dept., **219** Scott St., Baltimore 3, Md.

AEROMATICS ARE AVAILABLE FOR THESE PLANES . . .
ARE BEING APPROVED FOR OTHER MAKES AND MODELS

Stinson • Bellanca Cruisair • Ercoupe • Cessna 120 and 140
Fairchild 24 • Piper Super Cruiser • Ryan Navion
Grumman Widgeon • Swift 125
Also available for numerous foreign models

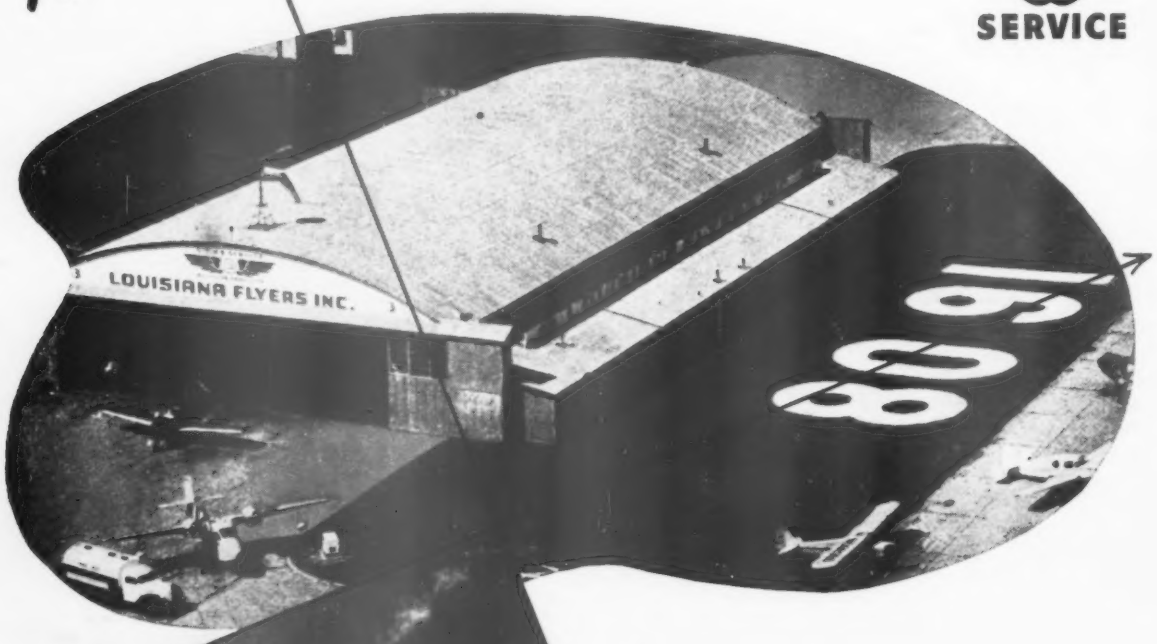
Aero matic

The propeller with a brain K KOPPERS *for your personal plane*

—Air-Controlled Automatic Propeller—Licensed under Patents of Everel Propeller Corp.

FLY WITH THE LOUISIANA FLYERS

CITIES SERVICE



Cities Service Refinery at Lake Charles, La.—source of highest quality petroleum products.

RIGHT ASTRIDE the main Gulf-coast air routes is this modern, fully equipped airport of the Louisiana Flyers at Lake Charles, La. Stop at this up-to-date, alertly managed field when making business or pleasure trips. Nearby is the mammoth Cities Service refinery, one of the world's largest suppliers of aviation products.

AT THIS AIRPORT—as well as at an increasing number of convenient, completely equipped fields—you'll find Cities Service aviation products and services. Cities Service Aero Gasolenes, Cities Service and Koolmotor Aero Oils, Trojan Aero Greases and other aviation specialties.

FACILITIES: All directional concrete runways, 150′ wide, from 5200 to 6240′ long. All night lighting. CAA Weather available. Radio range available for instrument approach. Ample hangar space. Major and minor repair service. Flying school. Cafeteria on field.

CITIES SERVICE

Cities Service Aviation Fuels and Lubricants